THE CONNECTIONS BETWEEN HEALTH AND DIET IN PREHISTORIC POPULATIONS

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Abstract

The connections between health and diet in modern populations are well established. Numerous studies have been conducted attempting to assess the dietary health of prehistoric populations from an examination of their skeletal remains. The health status of a population can provide crucial evidence in discussions of major changes in subsistence, and, in theory, much can be established from a study of skeletal remains. Assessments of child and adult mortality, stature, dental health, the identification of specific nutritional deficiency diseases and other conditions can provide vital evidence to enable an interpretation of dietary sufficiency to be made. However, in practical terms, there are many problems in conducting such a study. Poor preservation of skeletal remains, inadequate retrieval methods, a skeletal assemblage unrepresentative of the size or composition of the whole population, inaccurate methods of osteological analysis, and the non-specific nature of many pathological lesions, can influence the results. This thesis takes a practical look at extracting evidence relating to diet from skeletal remains. As a vehicle for testing the feasibilities of linking skeletal manifestations to diet, the human remains from two very different prehistoric populations are examined. One is a tall, robust, late Mesolithic population, in apparent good health, from the site at Schela Cladovei in the Iron Gates region of the Danube Valley, Romania. Most of the skeletal remains were well preserved and in full articulation and burial was mainly by single inhumation. The inhabitants would have had access to abundant natural food resources, especially fish and other aquatic food resources from the Danube. The other group is from an Early Bronze Age pit-grave, Tomb N, in Hili Gardens, Al Ain, United Arab Emirates. The tomb contained the fragmentary, commingled remains of hundreds of individuals. Although situated in an oasis, food resources in the hot, arid environment would have been restricted. The results of the osteological analyses of these two populations, the accuracy of the methods used and the resulting interpretations of dietary health are analysed and discussed.

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Declaration

I declare that this thesis is composed entirely of my own work and that it has not been submitted for any other degree or professional qualification

CHAPTER 1. INTRODUCTION

The Connections between health and diet

The Oxford English Dictionary's definition of health is "the state of being well in the body or mind"; diet is "the kinds of food that a person or animal habitually eats". Brothwell and Brothwell (1998, 13) state that food is " all solid and fluid substances which permit the human organism to grow and maintain its health throughout life". According to the Manual of Nutrition (Ministry of Agriculture, Fisheries and Food, 1985, 1) food provides "material from which the body can produce movement, heat, or other forms of energy, material for growth, repair or reproduction, and substances necessary to regulate the production of energy or the processes of growth and repair". The nutrients within food consist of "carbohydrates which provide the body with energy, and may also be converted into body fat, fats which provide energy in a more concentrated form than carbohydrates, and may also form body fat, proteins, which provide materials (amino acids) for growth and repair, minerals, which are used in growth and repair and help to regulate body processes, and vitamins, which help to regulate body processes".

The connections between diet and health are well established. "The maintenance of health in an individual depends upon the consumption and absorption of appropriate amounts of energy and all the nutrients" (Ministry of Agriculture, Fisheries and Food, 1985, p3). *Appropriate* amounts of energy and nutrients, or, a 'balanced diet', are crucial. Poor health affects how we operate in society: it is therefore vital that people are healthy. Both under-nutrition and over-nutrition can lead to poor health. Nowadays, in the west, we are all familiar with the effects of over-nutrition. Large proportions of western populations are clinically obese, mainly as a result of too much fat in the diet, combined with the low levels of activity associated with modern lifestyles. This obesity is responsible for the development of various conditions, such as arthritis, heart disease and diabetes mellitus. Such effects of over-nutrition among more affluent societies are counterbalanced by serious levels of inadequate nutrition in some Third World countries, particularly evident in a number of African states.

Inadequate nutrition can present in two forms: undernutrition, where the quantity, i.e. the overall calorific intake, is insufficient, and malnutrition, where there is sufficiency of the total amount of calories but there are severe deficiencies in the nutritional quality of the diet (Food and Agriculture Organization of the United Nations, 1963). Malnutrition is common in areas where a high proportion of calories are obtained from carbohydrates and low levels of animal protein and fruit and vegetables are consumed. The Food and Agriculture Organization (FAO) (1963) goes on to state that insufficient calorific intake in adults, results in weight loss or a reduction in physical activity, or both, and, in children, in poor growth and low levels of activity, while nutritional deficiencies, if severe, can lead to the development of deficiency diseases, and in a minor form can contribute to poor general health.

The most important specific nutritional deficiency diseases include kwashikor, caused by insufficient intake of protein, keratomalacia, vitamin A deficiency, which can result in blindness, beriberi, the result of a lack of vitamin B_1, in populations which rely on high volumes of cereal, and pellagra, common among maize eaters (Davidson *et al.*, 1979). Other nutritional deficiency diseases include scurvy, vitamin C deficiency, rickets or osteomalacia, caused by a lack of vitamin D, and iron deficiency anaemia.

Undernutrition can have less specific, although serious, effects. Marasmus is "the continued restriction of both dietary energy and protein, as well as other nutrients" (Davidson *et al.*, 1979, 255) and leads to general wasting. A report by the Food and Agriculture Organization and the World Health Organisation on the problems of food and nutrition in sub-Saharan Africa (Food and Agriculture Organisation of the United Nations, 1959) found few specific nutritional diseases, although infant mortality was high at 150-500 per 1000 live births [this compares with 1 in 1000 in the USA (Food and Agriculture Organisation of the United Nations, 1963)], mortality of the 1 to 4 years age group was also high, and both adults and children were underweight when compared with European standards. The factors were due to insufficient calorie intake. On average, the calorific value of the diet was 10% less than that required (2000-2100), with peaks of up to 30% at certain times. Other factors were low protein intake, except in areas where fish were available, weaning, and the fact that children were not given an adequate share of the family's food.

Both forms of poor nutrition, generally termed protein-energy malnutrition or (PEM), can occur simultaneously in individuals or populations and can lower resistance to infections and diseases. Mild to moderate PEM can reduce resistance to gastroenteritis and respiratory and other infections and probably accounts for much of the high mortality in children between 1 and 4 years in the Third World.

Establishing the connections between health and diet from skeletal remains

This study is concerned with identifying deficiencies in diet in past populations from the examination of their skeletal remains. Some deficiency diseases result in specific skeletal changes, which can be identified from an examination of the bones. Other, less precise, indicators, such as age at death, stature, etc., can lead to inferences on health and diet. However, not all diet-related diseases or deficiencies leave traces on the skeleton. For example, prolonged vitamin A deficiency can cause severe eye lesions or complete blindness (Ministry of Agriculture, Fisheries and Food, 1985, 43). Such a deficiency would be difficult to on the skeleton. Furthermore, general indicators such as age at death, or average height may not be solely associated with diet. These may be related, at least in part, to other factors, such as disease or genetics. Therefore any attempts to establish the dietary health of a population based on skeletal evidence can never hope to be all embracing.

Specific diseases related to diet include vitamin C deficiency (scurvy), vitamin D deficiency (rickets in children and osteomalacia in adults) and iron deficiency anaemia.

Vitamin C deficiency (scurvy)

Vitamin C (ascorbic acid) is essential for the maintenance of connective tissue, to fight infection, and to aid the absorption of iron. In humans and some animal species vitamin C must be obtained from food. Small amounts can be acquired from milk and liver, but in most diets vitamin C is derived from fresh vegetables and fruit. (Ministry of Agriculture, Fisheries and Food, 1985, 50). A prolonged lack of vitamin C in the diet results in scurvy. Because the body can store vitamin C, the disease normally takes several months to develop.

Although relatively rare nowadays, scurvy was a common disease until the beginning of the last century. Outbreaks amongst ships' crews on long sea voyages have been well documented. According to Passmore and Eastwood, infantile scurvy became a problem towards the end of the nineteenth century when human milk substitutes, which contained little or no ascorbic acid, were developed (1986, p324). A greater awareness of dietary needs means that scurvy is now an uncommon disease, although isolated cases still occur in individuals with poor diets and "in poor nomadic and peasant populations in arid or semi-arid districts, when the rains fail and there is a threat of famine" (Passmore and Eastwood, 1986, p324).

One of the physical effects of scurvy is haemorrhaging into the soft tissues, bones and joints. As a reaction to the haemorrhaging, new bone is formed, and it is this reactive new bone formation that enables scurvy to be identified from human skeletal remains. Any part of the skeleton can be affected, although the evidence is more likely to be seen in the jaws, the orbits and along the lines of the temporalis muscle (Roberts and Manchester, 1995, 171). The most commonly reported symptoms are bleeding of the gums with the teeth becoming loose and gradually falling out.

Vitamin D deficiency

Vitamin D is necessary for "the absorption of calcium and phosphorus and the mineralisation of osteoid (the organic matrix of bone) and cartilage (Roberts and Manchester, 1995, 173). Vitamin D is mainly manufactured in the body from sunlight via exposed skin (Brothwell and Brothwell, 1998, 181). It is also found in fish oils and dairy food. Insufficiency in this vitamin causes a softening of the bones. In children the disease is known as rickets. Individuals with bowed legs were a familiar sight in Britain as recently as 100 years ago. Other skeletal manifestations of rickets are flaring in the ends of the longbones of the legs and arms, nodular prominences on the ribs, pelvic deformity and poor dental development and thinning of the cranial bones (Roberts & Manchester, 1995, 173). In adults, bone demineralisation caused by an insufficiency of calcium as a result of vitamin D deficiency (or disease) is known as osteomalacia and causes collapse and deformity on the bones, mostly restricted to the spine and pelvis (Roberts & Manchester, 1995, 175).

Iron deficiency anaemia

"Healthy adults contain about 3-4 g of iron, more than half of which is in the form of haemoglobin, the red pigment in blood" (Ministry of Agriculture, Fisheries and Food, 1985, 33). Iron is stored in the body and if a diet is lacking in iron, which is largely found in high quantities in red meat, legumes and shellfish (Roberts and Manchester, 1995, 166), the body's stores are depleted and anaemia results. While not all anaemias are related to diet, it is thought that iron deficiency anaemia causes bony changes in the cranium and orbits to develop (Stuart-Macadam, 1989, 217-218).

While the effects of the above diseases, can, in the right circumstances, be fairly easily identified and their connections with diet clearly linked, the consequences of general malnutrition on the skeleton is more difficult to assess. The effects of malnutrition can be wide-ranging and non-specific. Long-term insufficient nutrition can lead to slower growth amongst children and smaller stature in adulthood. It can make individuals more susceptible to infection and other diseases. The synergistic interaction of malnutrition and infection can result in high child mortality and lower age expectancy in general, but, based on the skeletal remains of any single individual, it would be very difficult to relate, with any degree of certainty, small stature or early death directly to diet. Poor diet during childhood can leave traces of the arrest of growth on the long bones (Harris' lines) and teeth (hypoplasia) and, while these markers, a sign of the body's mechanism for dealing with episodes of insult, i.e., growth ceases temporarily, can also be indicative of periods of childhood diseases, evidence of repeated periods of such stress, widespread among a population, could be interpreted as being related to diet. A further complicating factor is the inter-relationship between deficiencies. For example, an individual whose diet is poor could suffer the effects of more than one dietary related disease. Insufficient diets could simultaneously be deficient in vitamins C and D, and iron.

Dental evidence probably carries the greatest potential for establishing relationships between health and diet. Teeth are in direct contact with the food we eat and the connections between sugar and caries are well recognized. Besides carious lesions, with its associated consequences such as dental abscesses and tooth loss, the pattern and degree of tooth wear is affected by the abrasiveness of the diet. For example, attrition in the ancient Egyptians has been associated with a rough type of bread which also contained grains of sand (Ruffer, 1920). Also, as mentioned above, hypoplastic lesions on the teeth can provide an insight into periods of stress during childhood at the time the teeth were being formed. However, while the state of the dentitions can be directly related to diet, it is important to remember that dental disease can be multi-factorial in origin, with complex inter-relationships between diet, ageing, non-dental disease, and trauma (Lukacs, 1989).

The connections between health and diet among prehistoric populations

While environmental studies such as animal bone and palynological analyses can provide an insight into the type of food resources both available and exploited by the local population, such studies in themselves are unlikely to be able to demonstrate whether those resources were adequate to maintain the health of the population. Only a study of the human remains can provide direct evidence on the health of the population.

It is generally acknowledged that pathological lesions, dental wear, prevalence of caries, and other skeletal markers can be important indicators of diet in ancient populations. Establishing connections based on the evidence provided by the examination of human skeletal material, while having enormous potential, is limited to those dietary related conditions which leave traces on the skeleton, and the wider inferences which can be made, from assessments of dental health, age at death, stature and the general health of the population being studied.

In the past, and especially in more recent years, there have been numerous studies attempting to reconstruct the diet of a population from information extracted from an analysis of their skeletal remains. Probably one of the earliest and most significant of these was Simon Hillson's study of the dental remains from Ancient Egyptian and Nubian cemeteries (Hillson, 1979). In this paper Hillson proposed that changes in calculus deposits, caries rate and attrition over time could be related to dietary changes, and that variations in the frequency of hypoplasia between communities could reflect differences in weaning times.

A major publication, Palaeopathology at the Origins of Agriculture, edited by Cohen and Armelagos (1984), is a collation of syntheses from various areas of the world of the palaeopathological evidence for human health before, during and after the Neolithic revolution. This was closely followed by The Analysis of Prehistoric Diets, edited by Gilbert and Meikle (1985), which included such papers as Skeletal Pathologies as Indicators of Quality and Quantity of Diet (Martin *et al*), Diet and Dentition: Developmental Disturbances (Rose *et al*) and The Analysis of Dental Wear and Caries for Dietary Reconstruction (Powell). In a more recent publication, morphological and palaeopathological changes in some European populations were used to develop understandings of the transition to agriculture and farming (e.g., Meiklejohn and Zvelebil, 1991).

Several workers have attempted to relate various aspects of dental anthropology to diet (e.g., Macchiarelli, 1989; Littlejohn and Frolich, 1989; Lukacs, 1989) and, more specifically, there have been various studies linking high rates of caries or tooth loss to the consumption of dates amongst Gulf populations (e.g., Nelson *et al.*, 1999; Hojgaard, 1983). There are also numerous papers on specific nutritional diseases such as scurvy, rickets and iron deficiency anaemia (e.g., Ortner *et al.*, 1999; Stuart-Macadam, 1989).

Wood *et al* (1992), however, question some of the inferences commonly made in assessing prehistoric health from skeletal samples. They caution that skeletal samples are made up by the 'non-survivors' and cannot therefore be taken to be representative of a living population. They also suggest that high levels of palaeopathological lesions, especially if they are healed, rather than being interpreted as a sign of poor health, may indicate good health, on the basis that the individuals had *survived* the period of assault.

Problems with establishing connections

While in theory it may be possible to relate skeletal manifestations to diet, in practical terms, there can be many difficulties.

The success of establishing connections between health and diet amongst prehistoric populations is crucially dependent on the nature of the evidence, and the condition of the human remains can greatly influence the results. Skeletal remains are often incomplete, which makes the identification of a disease, or the full extent of a disease where it has been accurately identified, difficult to assess. Incomplete skeletons, eroded bones, disarticulated remains, can all obstruct the assessments of the number of individuals in the population, stature, sex, age at death, the detection of disease, or the full extent of disease on the individual.

The nature of the evidence is also very much dependent on retrieval methods used. For example, bones from different individuals may become mixed, either during or after excavation. Limitations on excavation time and methods can result in bones becoming fragmented during excavation. Less than thorough excavation methods can cause vital evidence to be missed, such as the smaller bones of the hands or feet, or isolated teeth, or foetal bones.

Population size and composition are important. Even if the remains are in good condition, the findings from a single, or only a few skeletons, may not be representative of the population as a whole. For example children's remains may be under-represented because of the poorer survival of immature bone, or because some or all immature individuals have been subject to different burial rites. This could give a false impression of infant mortality rate, a key factor in assessing the health status of a population. A burial area may have been reserved for high status individuals whose diet may have been different from the population as a whole, or only contain the remains of war dead, in which case, they are liable to include an unrepresentative proportion of younger males.

This problem of bias in prehistoric populations is discussed by Waldron (1994). He proposes that four "extrinsic factors", are likely to reduce the size of the sample available for study: " (i) the proportion of those dying who are buried at the site being studied, (ii) the proportion of those buried who survive to discovery, (iii) the proportion discovered and (iv) the total recovered" (Waldron, 1994, 12).

While any skeletal population available for study is unlikely to be representative of the whole population, Waldron identified one "intrinsic factor" which can also make a skeletal population unrepresentative of the living population: the fact that the skeletal population is dead and may differ in health or composition from the living one (Waldron, 1994, 16). Wood *et al* (1992) also suggest that inherent inaccuracies can arise by assuming that there is a direct relationship between the health of a living population and a skeletal samples.

Methods used in the analysis of human remains are not always accurate or viable. There are problems with the accuracy of some methods used in the assessments of age at death, sex, and stature, often because standards, established for modern populations or other ancient populations, may not be directly applicable to the one being examined. Often, the interpretations are subjective, although they are frequently taken at face value.

There can be difficulties in arriving at an accurate diagnosis because many diseases have similar effects on the skeleton and can be difficult to distinguish. This problem is discussed by Roberts and Manchester (1995, 173) who, in considering the rarity of scurvy in the palaeopathological record, state:

"The widespread new bone formation in this deficiency disease may also be a complicating factor, considering the number of disease processes that can initiate this patterning of skeletal abnormalities. It is likely that cases are not being recognised or are being misdiagnosed especially if the orbital lesions are being mistaken for the changes of anaemia".

Many skeletal lesions are non-specific and could relate to a number of different diseases or processes. For example, in discussing the problems of diagnosing tuberculosis from dry bone specimens Morse (1967, 249) commented:

"if one attempted to make a diagnosis from a prehistoric bone specimen, the only chance one would have of even making a good guess would be if the spine was involved. Tuberculosis in other locations would be indistinguishable from too many other diseases".

The experience of the examiner is crucial. Attempting to identify conditions from textbook examples can cause difficulties. Photographs or descriptions of disease are often the most extreme, classic examples available, which can cause problems when trying to compare milder or atypical cases, or a disease or condition may have been misdiagnosed entirely by the author. In such cases, inexperience may mean that the disease remains undiagnosed or is misdiagnosed. The more experienced examiner may have previously seen, or be aware of the bony manifestations which may develop in the various stages of the disease. Lack of experience in the examiner can give misleading results. For example, perikymata, naturally occurring ridges on teeth, may be confused with hypoplastic developmental disturbances in the formation of tooth enamel, thought to be caused through periods of malnutrition or disease during childhood, leading to incorrect conclusions. In a series of workshops, where the participants had a high degree of experience in skeletal remains, the aim of which was to assess the accuracy of diagnosis of disease in skeletal remains, Miller et al (1996) found an overall accuracy of 28.6% in diagnosing specific diseases and 42.9% in assessing general disease categories. They found a greater degree of accuracy in disease processes which leave characteristic bony changes or have been well documented. Limiting factors they conclude are conditions which leave ambiguous traces, those where there is a lack of modern medical data on skeletal changes, and mild or asymptomatic changes. The results of the exercises led the authors to highlight the importance of objective and detailed descriptions of skeletal changes. In 1994 Buikstra and Ubelaker, as part of a series of standards for all aspects of human skeletal data collection, published recommendations for the recording of skeletal abnormalities, stressing the importance of the use of standard terminology and the objective recording of the type and degree of skeletal changes.

Some skeletal characteristics, such as robusticity and height, which can be strongly related to diet, may also have a genetic component, the relative significance of which may be difficult to determine.

It is important to compare the population's statistics with other comparable populations.

Aim of the research

This aim of this thesis is to take a critical look at the practicalities of extracting evidence relating to diet from a macroscopic examination of the skeleton. The reliability of the methods used, and the problems encountered, in extracting evidence for age at death, stature, disease, skeletal indicators of stress, such as dental hypoplasia, and dental attrition, and the possible links with diet will be discussed. As a vehicle for testing the feasibilities of linking skeletal manifestations to the dietary heath of a population, the human remains from two very different prehistoric populations are examined, neither of which has been the subject of previous osteological analysis.[1] The first is a Late Mesolithic population from Schela Cladovei on the Romanian banks of the Danube; the other is Early Bronze Age from Tomb N, Hili Gardens, Al Ain in the United Arab Emirates. The human bone assemblage from Schela Cladovei consists of a series of 74 articulated skeletons, mostly in good condition, as well as numerous disarticulated remains; Tomb N is a pit-grave containing the commingled and very fragmentary remains of hundreds of individuals. The inhabitants of these two sites are separated by approximately 4000 years in time, lived in very different geographical areas, had very different food resources available, and had very different burial rites. The results of the skeletal analysis, rather than the populations themselves, are compared and contrasted. It is not the intention to directly

[1] The two populations were chosen almost by chance. Initially, it was the intention to study only the Tomb N material. However, an opportunity arose to examine the well preserved remains from Schela Cladovei, and, in order to incorporate both sets of data, the emphasis of the research was modified.

compare the health and diet of these populations; only the methods and success, or otherwise, of the two different analyses will be compared. There would be little point in comparing the populations. Because of the vast temporal, environmental and cultural differences between these prehistoric peoples, and the necessarily different methods, which had to be utilised for data collection, any comparison could be meaningless.

In this paper both sites are described and placed within the context of their ecological and temporal settings and their archaeological background (Chapter 2). Information of the methods used and the nature of the material are provided in Chapter 3. The results of the osteological analyses for both populations are given in full in Chapter 4. The results and methods used in assessing age, sex, stature, skeletal and dental pathology, the respective populations and the possible relationship to diet are discussed in Chapter 5. Final conclusions are presented in Chapter 6.

CHAPTER 2. THE SITES AND THEIR ARCHAEOLOGICAL SETTINGS

2.1 Schela Cladovei

The site

The site at Schela Cladovei, Romania is situated just outside the Iron Gates area of the lower Danube Valley in the south west of Romania (Figure 1). Excavations on a series of Late Mesolithic, Early Neolithic and later occupations, situated on a terrace close to the banks of the Danube, began in 1965 and continued until 1991 under the sole direction of Vasile Boroneanţ. Two phases of Mesolithic settlement (Schela Cladovei I and II) have been claimed and two or more for the early Neolithic (Bonsall *et al.*, 1997). Skeleton numbers M1 to M51 were recovered during this phase.

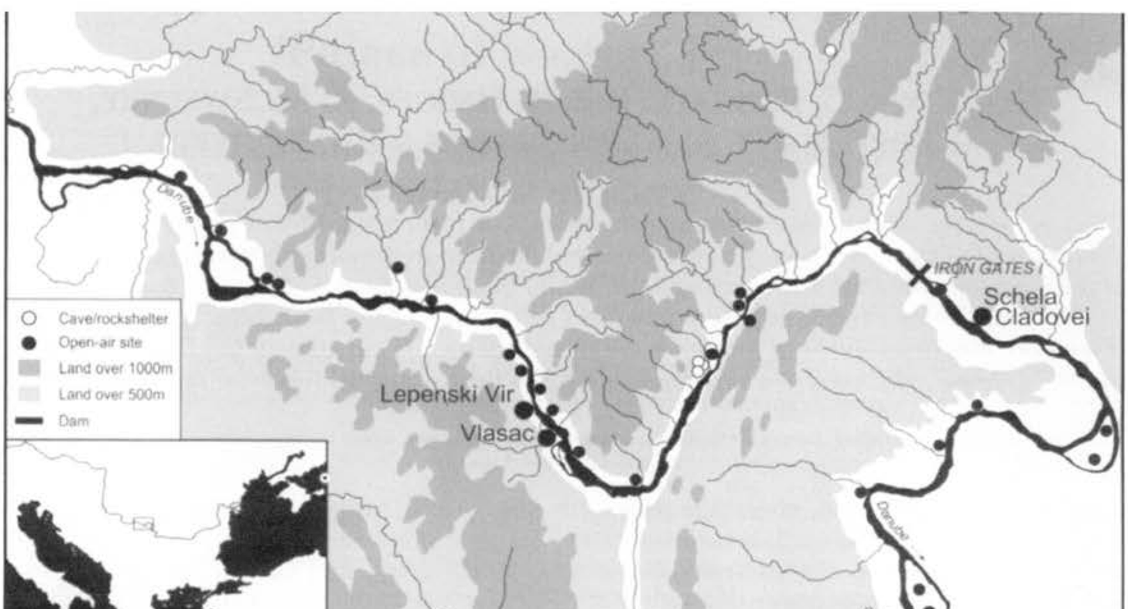

Figure 1: Map of the Iron Gates showing the location of the major sites. (© G.T Cook, C. Bonsall, R.E.M. Hedges, K. McSweeney, V. Boroneanţ, L. Bartosiewicz & P.B. Pettit.)

From 1992 to 1996 the work recommenced as part of a joint Romanian-British multidisciplinary research project, co-directed by V. Boroneanţ and C. Bonsall. It is likely that the area of occupation more extensive than that already excavated[2].

Skeletons M52 to M69, M95 1-3 and M96 1-9 belong to this later phase of excavations. Excavation methods changed slightly with the commencement of the joint project. The earlier series of excavations had been carried out in square metres and concentrated on the removal of complete features, while in the later joint project, features were removed, still by square metres, but also in 5 cm spits, and each bone was given a unique identifying number.

Although archaeological horizons from both the late Mesolithic and early Neolithic were present at Schela Cladovei and some of the above remains were assigned a Neolithic date on the basis of the depth at which they were buried, all ^{14}C dates obtained so far from skeletal remains have been within the late Mesolithic. Eight skeletons (M42, M43, M46, M48, M49, M50, M52 and M55) range in date from 8290±105 BP to 8570±105 BP. Calibrated, these dates indicate that burial of the remains occurred between 7691-7496 and 7489-7093 BC, a span of roughly 200 years. (Bonsall *et al.*, 1997; Cook *et al.*, 2001)

Both burials and traces of settlement were uncovered. Architectural features largely took the form of stone settings, some of which were concentrations of stone cobbles, which have been interpreted as dwellings, although no post-holes were identified, and trapezoidal settings of stone slabs, recorded from other sites in the region and interpreted as stone-lined hearths. However, no evidence of burning was detected in association with one such 'hearth' at Schela-Cladovei (Bonsall *et al.*, 1992). The area therefore appears to have been both a settlement and a burial area.

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[2] Excavation of another area of the site commenced in 2001 under the direction of Adina Boroneanţ. To date no further skeletal remains have been uncovered from these new excavations.

The majority of the burials were of extended skeletons lying on the backs, although a few were on their side. Traces of grave pits are discernable in some cases dug into the alluvium (Boroneanţ *et al.*, 1995).

Other major sites with late Mesolithic horizons in the area, with both settlement and burial remains include Lepenski Vir, on the right (Serbian) bank of the Danube, and approximately 65 kilometres from Schela Cladovei, Hajdučka Vodenica on the right bank, Icoana, on the left bank, opposite Hajdučka Vodenica, Padina, a few kilometres from Lepenski Vir, and Vlasac, close to Padina (Radovanović, 1996).

Faunal remains in the Iron Gates

Examination of the animal remains from five sites in the Iron Gates area (Icoana, Vlasac, Lepenski Vir I, Lepenski Vir II and Haijdučka Vodenica I/II) has demonstrated that red deer was an extremely important source of food for the Mesolithic populations. At four of the sites it was the main wild animal hunted, while at Icoana red deer accounted for 38.58% of the animal remains. Also important was wild pig, accounting for 53.35% of the bones from Icoana. Other species identified were roe deer, wolf, red fox, brown bear, wild cat, chamois, auroch, beaver and brown hare (Radovanović, 1996, p53-54). At Vlasac, from a total of almost 30,000 animal bones, fish remain accounted for approximately 60% of the total, with carp, pike and catfish among the identified species. Evidence from various sites in the Iron Gates and elsewhere led Bököni to conclude; "fishing must have been among the most important human economic activities in the period just preceding the earliest Pottery-Neolithic in Southeast Europe" (Bököni, 1978, p37). In terms of the amount of meat provided however, fish were in second place to wild ungulates, especially red deer and wild swine.

According to Bolomey (1973, p50), economy in the Iron Gates included "a) fishing, proved by the large quantity of fish bones occurring at all sites; b) gathering of land snails, mussels and land tortoises and red deer casts; c) occasional hunting of nine different species of furred animals, plus chamois, cattle and birds; d) large scale, permanent exploitation of red and roe deer for meat and artefactual raw material; e) selective killing of suids".

Analysis of the faunal remains from the Mesolithic contexts at Schela Cladovei, undertaken by Dr Laszlo Bartosiewicz, has revealed 14 species of wild mammal and fish. Terrestrial faunal remains showed that red deer and wild pig were predominant (Bartosiewicz, L. *et al.*, 1995). A high proportion of anadromous species, particularly sturgeon, among the fish remains, led Bonsall *et al.*, (1997) to conclude that freshwater fish were of greater importance to the diet of the Schela Cladovei population than to those of Lepenski Vir and Vlasac, where fish remains consisted of smaller species, carp and catfish.

There is little direct evidence for the exploitation of plants by the Mesolithic populations of the Iron Gates, although Prinz (1987), on the basis of the results of pollen analysis, claims that berries, fruits, nuts, seeds and 'green leafy vegetables' were consumed at Vlasac, and it does seem reasonable to assume that such available food resources would have been taken advantage of.

Stable isotope analysis

Bone samples from 11 skeletons from the earlier excavations at Schela Cladovei were used in wider study of diet, based on isotope geochemical analysis, in the Mesolithic and early Neolithic populations of south-east Europe. The results of this research indicated that the Mesolithic diet included large quantities of fish and that women consumed less protein than men (Lennon, 1991). A subsequent study based on stable isotope analysis of bone samples from three sites in the Iron Gates, Lepenski Vir, Vlasac and Schela Cladovei, including 8 adults excavated at Schela Cladovei in 1991-1992, suggests that aquatic/riverine foods throughout the Iron Gates Mesolithic were of far greater importance as a source of protein than plants and terrestrial herbivores. Some sex differences indicating variations in dietary intake, assumed to be related to the movement of people between groups, were noted at Vlasac and Lepenski Vir. No such distinctions were noted among the Schela Cladovei samples. (Bonsall *et al.*, 1997.)

2:2 Tomb N, Hili Gardens

The site

The site at Hili Gardens is located in the Hili oasis, in the modern city of Al Ain, Abu Dhabi, United Arab Emirates (UAE), situated between the Omani Mountains and the Rub' al-Khali desert.

Tomb N is now enclosed within an archaeological park, which also contains two classic circular Umm an-Nar tombs, Tomb E, immediately adjacent to the pit-grave, now reconstructed, and Hili Grand Tomb, the largest monument in the UAE, more than 12 metres in diameter, and thought to be originally at least four metres high. There are also several tombs outside the park. Close to the tombs within the park are several mud-brick habitation sites from the same period. Hili 1 was a high tower with several rooms, surrounded by a thick wall and a moat, with a well in the centre. Hili 10 was a similar building to Hili 1. A third building, of similar construction, is situated immediately outside the park.

Tomb N was discovered in 1983 while cleaning up after the excavation of the immediately adjacent, upright and circular, typical Umm an-Nar tomb, Tomb E (Figure 2).

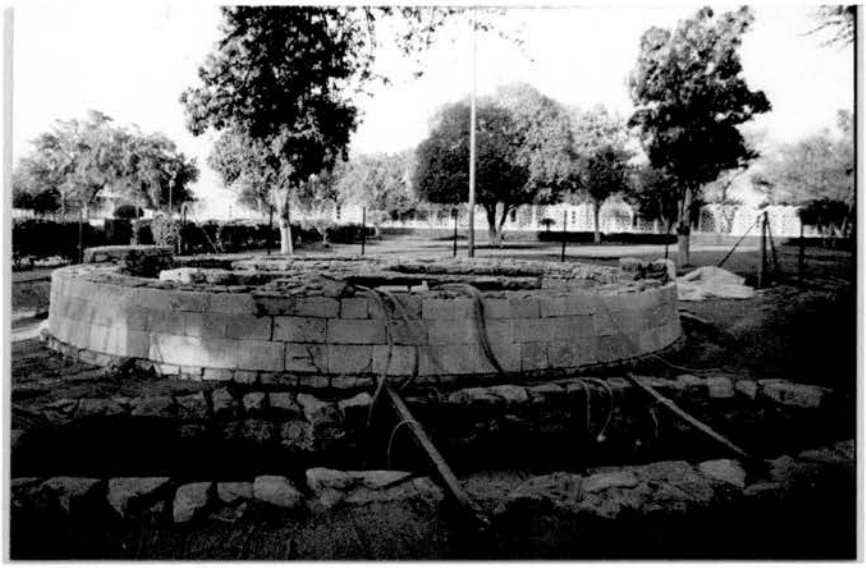

Figure 2: View showing the proximity of Tomb N to Tomb E. Tomb N is in the foreground

Tomb N is a partially stone-lined oval pit, measuring 7.65 m long, 2.70 m wide and from 1.5 m to 2.5 m deep. The collective pit-grave, of a type rarely identified in the U.A.E., which contained a vast amount of human remains and artefacts, was the first such grave to be discovered in the UAE. Only two are known so far; the other, which is similar but smaller, has since been discovered at Mowaihat in the northern Emirate of Ajman (Haerinck, 1991). This grave was also found close to a monumental Umm an-Nar tomb. Such pit-graves, which cannot be seen in the landscape, unlike the monumental circular graves, have only been discovered until now by chance and have not been the subject of specific research in the U.A.E. They are very different from the circular monumental tombs of the Umm an-Nar type, not only in shape and construction technique, but also in the internal arrangement of the bone deposits.

The excavation of Tomb N, took place over four seasons from 1984 to 1988, under the direction of Dr Walid Yasin al-Tikriti of the Department of Antiquities and Tourism, Al Ain. A preliminary report on the excavation was published in Arabic (Haddu, 1989).

Figure 3: Tomb N, Hili Gardens – Surface Layer

(Photograph courtesy of Dr Walid Yasin al Tikriti)

Excavations of the tomb revealed that the upper layer, about 70-80 cm thick, was sterile, containing no human or artefactual remains (Figure 3). The deposit containing the remains, which covered almost the entire surface of the tomb, was 1.7 m thick (Figure 4). For the purpose of excavation, the tomb was divided into 4 sections and, in the absence of any clear stratigraphy, 6 arbitrary layers of approximately 30 to 40 cm deep . The contents of the tomb, apart from a section in the middle, roughly corresponding to Section 3, were completely removed. [3]

[3] Excavation of the part of the tomb left in situ recommenced in 1999 as a joint project between the Department of Antiquities, Al Ain and the French Archaeological Mission in the United Arab Emirates. So far, five seasons have been conducted and more are planned. Excavation techniques, which are very different from those of the original excavation, involve specialised field anthropologists and very slow and precise methods aimed at extracting an optimum of anthropological information. I have been working as part of this team, with responsibility for the post-excavation analysis of the human remains. The results of this subsequent analysis, although occasionally referred to in the text, do not form part of this study.

Figure 4: Tomb N, Hili Gardens – during excavation 1980s
(Photograph courtesy of Dr Walid Yasin al Tikriti)

The human remains from Tomb N have never previously been studied, indeed this study is the first for a pit-grave in the Umm an-Nar period, and, while human remains from several of the classic, circular tombs have been the subject of anthropological examination, with the exception of some brief reports (for example, Bondioli *et al.*, 1998; Blau 1991), to date, no detailed, comprehensive report on human remains has been published.

The excavators had attempted to retrieve complete skeletons, but this proved to be impossible because of the volume of the remains, which were also extremely mixed and fragmented. The skeletal material was therefore collectively retrieved by archaeological unit, i.e., by section and layer. Following excavation, the human remains were separated into "large bones" and "small bones", stored in cardboard boxes or cotton bags, and labelled according to the section and layer in which the bones were found. Thus, each bloc of human remains came from an arbitrary unit approximately 2 m by 2.7 m by 30 to 40 cm.

Grave goods consisted of over 300 complete pottery vessels, ranging from thin red pottery, grey goblets, household pottery, hanging pots (found mostly on burial sites) and small hand-made pottery containers, as well as numerous sherds, 33 chlorite (soap stone) containers, 13 calcite containers, beads made from bird bone, shells, chlorite, silver and red clay, a few copper and bronze rings and a square dagger blade. No weapons were found. Typological studies of the various artefacts suggest that the site was in use for at least the last few centuries of the third millennium BC.

Radiocarbon dates of 3730 BP ± 30 years (calibrated age range BC at 1 sigma, 2183-2040), from charcoal, originating from layer 3, and 3800 BP ±60 (calibrated age range BC at 1 sigma, 2325-2135) from bone from the basal level support the first results of the detailed study of the artefacts and pottery (Al Tikriti & Méry 2000) and confirm that Hili Tomb N dates to the very late Umm an-Nar Period. These dates suggest that the period of use of the grave was probably at least 100 and possibly, 200 years.

Tomb N is part of the Hili cemetery group dating to the Umm an-Nar period. Monumental tombs of circular shape are considered to be diagnostic of that period, which existed in the second part of the Early Bronze Age, from about 2700 to 2000 BC. Since the first discoveries on the Umm an-Nar island in the 1960s (Frifelt 1991), more than 70 of these tombs have been excavated in the U.A.E. and the Sultanate of Oman (see for example Vogt 1985). The Umm an-Nar tombs are compartmentalised stone structures, faced with fine worked ashlars blocks. By the end of the Umm an-Nar period, their diameter could reach up to 14 meters (at Grand Tomb, Hili Gardens, Mleiha and Shimal), with up to twelve compartments. The human remains are generally found in all compartments, and most skeletons are disarticulated and the bones fragmented. The number of individuals buried in the same grave reached several hundreds by the end of the Umm an-Nar period. The tombs were collective graves, the bodies being buried gradually over a period of time, the numbers often difficult or even impossible to estimate because of subsequent destruction and robbing and the methods of excavation used.

Among Umm an-Nar tombs, Tomb A at Hili North, excavated by the French Mission in the early 1980's, provided the most detailed information about burial customs (Vogt, 1985; Bondioli, Coppa and Macchiarelli, 1998). The use of this grave is thought to have extended over about 200-300 years, at the end of the third millennium

BC. It measured 10.3 meters in diameter and comprised of two storeys. One was below ground and the other above. The upper storey had been destroyed, but the subterranean storey consisted of two independent halves separated by a wall. Each half was subdivided into two compartments connected by a small passage. These compartments were reached from above. Most of the bones found in the destroyed upper storey were highly fragmented and disarticulated, and most had been burned. However, thirty-one articulated individuals were found lying on the floor of one of the subterranean compartments and it was assumed that this layer marked the final stage of the use of the grave. The bodies were placed south-north or north-south, in a contracted position with the legs bent and the right arm flexed, the hand in front of the face, or under the head. According to the anthropologists (Bondioli, Coppa and Macchiarelli, 1998: 233), this group included 18 adults of both sexes, and 13 juveniles and infants, of which 3 were of less than a year old. The mortality of infants and young adults was very high and some distinctive morphological traits were found on the bones, possibly suggesting close family connections. Burial customs were difficult to interpret because of disturbances that had occurred both while the grave was in use, and during subsequent destruction and robbing, but it was possible to carry out a partial reconstruction. It is assumed that after decomposition the bones lying on the floor of the subterranean compartments were transported to the upper part of the grave for the purpose of burning. Post-excavation studies showed that more than 300 different individuals were buried in the grave.

Other sites in the UAE dating to the Umm an-Nar period include Tell Abraq, Umm al Qaiwan, a circular, stone tomb, 6 metres in diameter, which contained, with the exception of one fully articulated skeleton, the disarticulated remains of 155 individuals of all ages (Al Tikriti, 1989).

Mowaihat, Ajman, United Arab Emirates, the only other pit grave discovered until now, also found close to a monumental round tomb, contained at least 120 disarticulated individuals, based on the number of skulls discovered. The human remains were said to only include a few skulls of children, although a full anthropological analysis has not been carried out (Haerinck, 1991).

Subsistence in the third millennium BC

The climate in the UAE today is hot and arid with a normal annual range in temperature from 27^{o} to 33^{o}. Summer temperatures can reach 50^{o} (Frifelt, 1991). Recent data from the Hili Oasis shows an annual rainfall of only 43 mm (Gebel *et al.*, 1989). The climate in the third millennium BC is thought to have been similar to that of today, although possibly slightly more wet and the ground water higher (Frifelt, 1991). It has recently been claimed that prior to the third millennium BC annual precipitation probably exceeded 350 mm but since about 2500 BC the trend has been one of increasing aridity and a lowering of groundwater levels (Jorgensen & al-Tikriti, 2002).

The Oman Peninsula remained largely unaffected by the development of the neolithic revolution that characterised the rest of the Near East (Cleuziou, 1998). Subsistence economies were based on "food gathering, intensive hunting and fishing, fully exploiting the diversified aspects of the arid environment", although it is thought that some forms of agriculture and animal husbandry existed alongside this mainly hunter-gatherer economy (Cleuziou, 1998).

This arid environment meant, "underground water must have been a vital means of survival" (al-Tikriti, 2002, 120). Oases, man made systems for agricultural production, which exploits underground water supplies, appeared in the Oman peninsula towards the end of the fourth millennium BC (Cleuziou, 1998). Cleuziou proposes that these artificial landscapes, created and maintained by human communities, were already fully developed by 3000 BC. Bondioli *et al.*, (1996), argue that oasis agriculture developed rapidly around 3000 B.C., and existed together with long-range pastoralism and offshore fishing. Cleuziou accepts that the third millennium B.C. inhabitants of the Oman Peninsula probably exploited various ecological resources and refers to evidence from the Ja'lan region which is suggestive of a society of oasis dwellers and fishermen (Cleuziou, 1998).

Imprints of two row barley and sorgum, dating to approximately 2500 BC, were found at the Hili oasis, indicating settled farming (Cleuziou and Costantini, 1980).

Palaeobotanical evidence from a ditch at Hili 8, an Early Bronze Age settlement site, in use during the whole of the third millennium, revealed three different varieties of barley, two varieties of wheat, sorgum, peas and dates. The presence of date seeds is significant because palm trees, besides being a food source, protect other plants and humans from the fierce sun. Examination of animal bones showed that 95% were from domesticated species, the most common being cattle, followed by ovi-caprids. Some remains of donkey and camels were identified. Cleuziou claims that a series of ditches, feeder trenches and sunken gardens at Hili 8 was comparable to the modern *falaj* system, which has been in existence in the UAE since at least the Iron Age (Al Tikriti, 2002).

According to Grupe and Schutkowski (1989, p 77), prior to the second millennium BC, settled life was the norm in the Oman peninsula. The establishment of nomadism, the main life style of the inhabitants of the area until recent times, did not occur until the beginning of the second millennium, when the camel was domesticated.

CHAPTER 3: MATERIALS AND METHODS

3.1 Materials

Schela Cladovei

The human remains from Schela Cladovei, recovered from three campaigns of excavation, which form part of this analysis, have never previously been examined. Most of the human material, including that from the earlier excavations, which had been housed in the Muzeul Regiunii Porților de Fer at Turnu-Severin, was transported to Edinburgh for study. Examination of some of the human bones, housed in the Museum of Archaeology and Art History, Bucharest, and a skeleton (M48) on display in the Muzeul Regiunii Porților de Fer, took place in Romania. Two further skeletons (M39 and M40), previously thought to be missing, were discovered in the museum at Turnu-Severin in the summer of 2001, and were examined on the premises.

Articulated skeletons, and in some cases groups of unassociated bones, are identified by the prefix M, and a number, starting from 1, assigned in order of discovery. The numbering of skeletons, using the M series, commenced in 1967 with M1. Skeletons M1 to M3 from this earlier series have been examined by the author. There are a few other burials in this early series without M numbers: an almost complete skeleton, minus a skull, from 1965 is known only by its location. A group of bones from 1967, from at least 2 individuals, were labelled "Complex Epi", another group of bones from 1968, including at least two individuals, were labelled "schelet ous la vatra" and a further two were identified as Largirea 1 and Largirea 1,55. It is not clear whether there were other skeletons in this initial series, and therefore how many have not been examined, but none have been located for the period 1969 to 1981, when it appears that no excavations were conducted.

Excavations recommenced in 1982 and the numbering of skeletons re-started with M1, and continued up to M51 in 1991. There are, however, several missing numbers from this second series and the following skeletons have not been examined: M2, M4, M7 to M11, M13 to M16, M20 to M22, M25 to M28, M32, M34 to M36 and M41 – a total of 23. It is not clear what happened to these remains, indeed there is some doubt whether some of them ever existed. A number of skeletons were said to have been destroyed in an earthquake that hit Bucharest in the 1980s. However, it has been established that a quantity of skeletons from Schela Cladovei are housed in the Francisc Rainer Institut, Bucharest. It is not clear at this stage which skeletons these are. Attempts to examine them have so far been unsuccessful.

The third, and joint, series of excavations commenced in 1992. Initially, the old system of numbering continued to M56. However, because of some confusion in the numbering, it was decided, when more burials were discovered in 1995, to change the system to identify the remains by year of excavation and a skeleton number, for example, skeleton M95/1, M95/2, M96/1, etc. Two skeletons, excavated in 1996 were given the identifiers M65 and M69. It is not clear why these numbers were assigned and whether there are skeletons bearing the intervening numbers M57 to M64 and M66 to M68.

In addition to skeletons from the M series, are groups of bones, mainly disarticulated remains, identified only by the location in which they were found. A total of 74 complete or partial skeletons have been examined from these three series of excavations.

Condition of the remains

The degree of completeness of the skeletons varied considerable with many being virtually complete and in full articulation and clearly undisturbed, while others were represented by only a few bones. Many of the skeletal remains included additional, isolated bones from other individuals; a large number of these isolated bones were from infants. Twenty-four skeletons were without their skulls, and there were several isolated skulls. One pit contained three disarticulated skulls (M44 and M45; the third, which was in a fragmentary state, was not assigned a number). These crania were found in an upright position and there were no signs of decapitation. Six individuals were represented only by the legs. In at least two cases (M55 and M56), the upper and lower leg bones were found in full articulation. At least one skeleton (M95/2) was incomplete because it had been truncated by a later pit.

Although no evidence of deliberate dismemberment was noted on the bones, it does seem clear that in at least in some cases intentional disturbance of the bodies was carried out, probably shortly after death because partial body parts were still in articulation. It is interesting to note that both of the skulls, M44 and M45 mentioned above, had unusually polished and smooth circular areas on the top of the cranium, about 80 mm in diameter, possibly suggesting that these parts had been exposed for a period. The numerous disarticulated remains found with articulated skeletons could have been stray bones from earlier burials, suggesting the repeated use of the site as a burial area, or it is possible that they had been deliberately included as "grave goods". Full details of the burials examined and their degree of completeness are included at Appendix 1 and summarised at Appendix 2.

Although both late Mesolithic and early Neolithic cultural horizons were present on the site, all of the dated human remains came from late Mesolithic contexts. A single skeleton, morphologically very different from the other individuals in the population, but unfortunately from an unsafe context without artefactual evidence, is thought to be Neolithic. However, until a Neolithic date can be confirmed by radiocarbon dating, the evidence from this individual must be discounted and is not considered in this study.

In general, bone preservation was good, and in many cases excellent, with a large proportion of intact bones surviving. In some cases thick deposits of calcium carbonate concretion had adhered to the bones, obscuring the bone surface, or fusing individual bones together. There were many instances of fusion of the bones in full, or almost full, articulation, concealing the joint surfaces; in other cases, disarticulated and/or unassociated bones were combined into one mass. Where possible, these deposits were removed, although in some cases where the concretion was particularly thick or hard, or where removal could have resulted in damage to the bone, it was left in place. This, unfortunately, resulted in some information being lost. For example, dental enamel was often obscured, preventing full assessment of dental hypoplasia.

The burials

Skeletons were mostly found in extended, supine positions although some individuals had been buried on their sides (Figure 5). Several of the skeletons had been disturbed or truncated by later features and as a result were incomplete. The discovery of numerous disarticulated bones possibly testified to the repeated use of the site as a burial place, and in some cases may have been a deliberate addition. Most of the burials contained additional bones from other individuals.

Figure 5: General View - Schela Cladovei

Tomb N, Hili Gardens

Tomb N, Hili Gardens contained the mixed remains of several hundreds of individuals. During excavation, in the absence of any clear stratigraphy or articulated skeletons, the bone material was collectively retrieved by archaeological units, based on arbitrary sections and layers. In total there were 4 Sections and 6 layers.

Permission to examine the remains was granted by His Excellency Saif bin Ali al Darmaki. Examination of the vast majority of the remains took place in short seasons of approximately one month over several years in the United Arab Emirates. Living and working accommodation was provided by the Department of Antiquities and Tourism Al Ain. Consent was given on occasions to bring small amounts of material back to Edinburgh for further study.

Locating the recovered remains

It proved difficult to trace the complete assemblage of excavated bones, which seems to have been housed at different locations. The bone had been stored in assorted cardboard boxes and cotton bags and no inventory had been compiled of the number of boxes or bags either by archaeological unit or for the whole tomb. There was therefore no way of checking whether all of the material had been located. On several occasions during the course of the examination of the remains further, substantial amounts of material were discovered. As it was important to incorporate this additional material, a choice had to be made as to whether to add the additional information to the existing results, or whether to start the assessment again. In some cases, because of the quantity of the additional material, it was easier to start again.

There is still no guarantee that all of the material has been located. Indeed, there are good reasons for believing that it has not. Besides bones, the tomb also contained a large quantity of complete and fragmented pots. The following table (Figure 6) is a diagrammatic representation of the tomb, showing the arbitrary units into which it had been divided in the absence of any clear stratigraphy, and illustrates those units in which pottery was found and those with bones.

	Section 1	Section 2	Section 3	Section 4
Level 1	P	Sterile	Sterile	Sterile
Level 2	P	Sterile	Sterile	Sterile
Level 3	P+B	P+B	Sterile	P+B
Level 4	P+B	P+B	P+B	P+B
Level 5		P+B	P+B	P+B
Level 6			P	P+B

Figure 6: Tomb N - Diagrammatic representation of the contents of the grave.
(P = pottery present: P+B = both pottery and bone present)

The above diagram illustrates that both pottery and bone were found in most of the archaeological units, except Section 1, Levels 1 and 2, and Section 3, Level 6, where only pottery has been located. As it seems very unlikely that the Hili inhabitants placed only pottery in these layers, it is reasonable to conclude that bone was also retrieved from these areas of the tomb, and has since been misplaced. It is also very possible that not all of the bone from the other levels has been located. (Several unlabelled bags of bone may have originated from these levels.)

Condition of the remains

The human remains were generally in a rather poor condition, with many, especially the larger bones, reduced to small fragments. There were virtually no complete long bones, and only one skull was in a reasonably intact condition. Long bones were largely reduced to small fragments, often only recognisable as part of one of the six major long bones of the body and not as a specific bone, and skulls generally survived as small pieces of cranium. Although the degree of fragmentation of the larger bones was high, many smaller bones, such as those of the hand and foot, patellae and vertebrae, and many immature bones had survived intact. Dental remains were in an unfortunately poor condition. While mandibular, and to a lesser extent, maxillary fragments had survived fairly well, most of those teeth, which from the nature of their sockets had clearly been *in situ* at the time of death, had been lost *post mortem*, and the crowns of the few teeth that were still *in situ* in the socket were damaged. While a large number of loose teeth were found, many of those had been unerupted at the time of death, and could not have originated from the empty sockets, and the total number of erupted teeth found were far fewer than empty sockets. Many of the loose teeth had also fragmented, and some were in the process of disintegrating; the roots and crowns of many had become impregnated with a crystalline substance (possibly hydroxy-`apatite- see Piepenbrink & Schutowski, 1987), which shattered the teeth as crystallisation progressed.

The examined remains weighed 413 kilograms. Appendix 21 gives a breakdown on the total weight by skeletal area (skull, spine, thorax, pelvis, limbs, hands, feet and unidentified), and by location within the tomb. Unidentified fragments accounted for 27% of the total weight, or 112 kilograms.

The following chart (Figure 7) shows the ratio of identified and unidentified as percentages by section of the tomb.

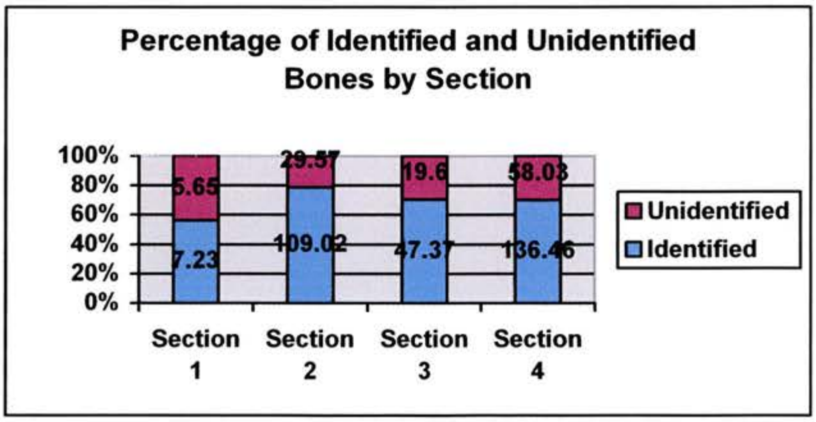

Figure 7: Tomb N – Ratio of identified to unidentified bones. The values shown relate to total weight in kilograms.

The higher percentage of unidentified (around 45%) in Section 1 reflects the poorer condition of the remains. This section is thought to be a later addition to the tomb. The rate of unidentified remains in Sections 3 and 4 are similar at approximately 30%, while that of Section 2 is less at around 20%. The reason for these slight disparities is not clear.

The ratio of identified to unidentified by level has also been examined (Figure 8). No human remains were found in layers 1 and 2. Some of the remains of Levels 3 and 4 of Section 2 have been combined and labelled S2 L3/4, and so, to aid consistency, data for Levels 3 and 4 for all sections have been combined.

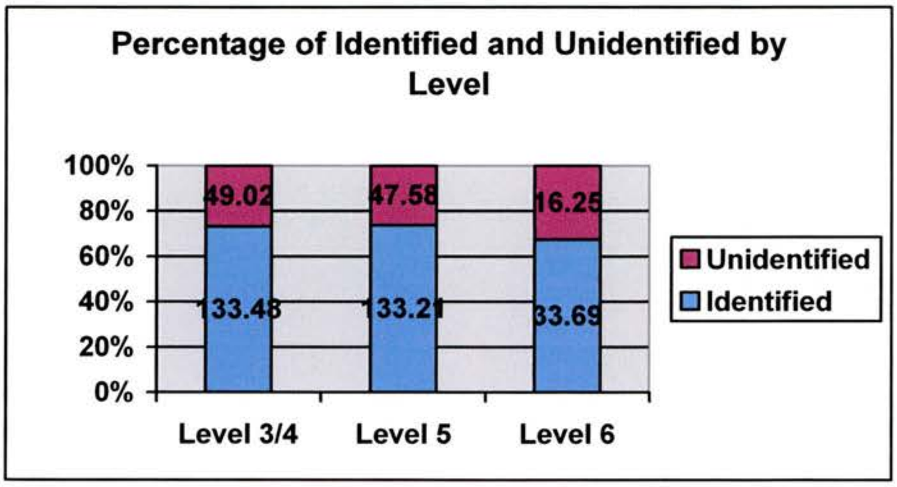

Figure 8: Tomb N – Identified and unidentified bones by level. The values shown relate to total weight in kilograms.

The level of unidentified fragments was 27% for the whole tomb and the above chart shows a remarkable consistency at all levels, with only a slightly greater percentage of unidentified fragments in Level 6.

The degree of fragmentation therefore, with the exception of Section 1, does not seem to vary according to location in the tomb.

Although the fragmentation rate was high, in general, bone preservation was fairly good, with little surface erosion, although this was not universally consistent within the tomb as a whole. (The bone from Section 1, thought to be a later addition to the tomb, tended to be more eroded.) Good preservation is evident in the condition of intact smaller bones and the survival of areas of trabecular bone, normally less resistant to erosion than more dense areas of cortical bone when the conditions for bone survival are less favourable.

The degree of fragmentation probably results from a number of factors. It is clear from slides taken during different stages of the original excavations that many of the bones were already commingled and fragmented prior to excavation, this possibly occurring during the process of re-deposition from the nearby upright tomb (Tomb E). Because Tomb E contained very few skeletal remains, it has been assumed by the excavators that the purpose of Tomb N was to house the cleared remains from the monumental tomb. However, a cursory examination of the surface of the section left *in situ* at the end of the original excavations of Tomb N where an articulated spinal column was visible, and the subsequent current excavations of that section, which has identified the presence of numerous articulated body parts, shows that at least some individuals had been deposited in a state of at least partial articulation. There were no internal structures to accommodate the bones within the tomb and no clear means of access and some fragmentation may also have been caused after initial deposition by trampling occurring while other skeletal remains were being deposited. It is also clear from the number of fresh breaks on the bones that further disintegration occurred during excavation or while in storage.

Some fortuitous matching of broken fragments, which were subsequently repaired and several clearly articulating or matching bones were found, but the volume of the material meant that, the reconstruction of individual bones or the separation of the remains into individual skeletons was not possible.

Some bones had been subject to burning. Examination of slides of the original excavation and findings from the current on-going series of new excavations of

Section 3 shows that there were at least two separate areas of burning in the tomb: one in Section 1, which is thought to be a later addition to the tomb, and another, which was situated in part of Section 2 and part of Section 3. It would appear that this burning occurred *in situ* (the articulated trunk of an individual uncovered during the new series of excavations displayed gradual colour changes throughout the length of the spine), and that the intention was not to fully cremate the bones. Close examination of the area of burning in the remaining Section 3 shows that, on the periphery of the area, bones had been subject to colour changes relating to low temperatures of burning, i.e., brown or black, and that bone colour towards the centre of the fire was whitish. Burnt bone can range from shades of red, brown, black, blue, grey, yellow, or white. Although there are some slight differences in reported results, in the main, the higher the temperature, the lighter the colour (McKinley, 2000). Light grey or white colouring occurs with temperatures in excess of 645°C (Mays, 1998, 217). Shipman *et al.*, (as cited by Mays) found that white or light grey colouring occurred with temperatures of 645 to 940°C, while Mays' experiments showed no change in colour over 645°C. Wells found that black colouring occurs with temperatures of less than 800°C, while temperatures above 800°C produced calcined bone, which ranged in colour from bluish-grey to white. Furnaces in modern crematoria were said to operate at between 820°C and 980°C (Wells 1960, 35). More recent research by McKinley (2000) indicates that modern cremators operate between 700 and 1000°C. Most of the burnt bones from the original excavations were brown or black, suggesting that the temperature of burning in the fire in Section 1 was similar to that in Sections 2/3. None of the typical warping or curved lateral splintering found in truly cremated bones were noted. Ubelaker (1978, 35) suggests that curved lateral splintering and marked warping can be indicative of the body being burnt while still 'fresh', i.e., soon after death. Mays proposed that fragmentation and distortion are most likely to be the result of rapid water loss during the cremation process (1998, 207). McKinley reports the absence of characteristic fissures when dehydrated bone was cremated (2000, 405). As there is no evidence of such fracture patterns on the Tomb N material, it is likely that the bones were not 'fresh' when burnt.

Burnt branches of wood have been recovered from within the burnt area at Section 3, suggesting that it was deliberately constructed. Mc Kinley (2000, 404) discusses the problems of cremating remains in open pyres: large amounts of fuel are required, and the retention and circulation of heat can be problematic, resulting in uneven degrees of combustion, with higher temperatures in the center of the fire and much lower degrees at the peripheries. Research into the areas of burning in Tomb N is still ongoing and the objective of the process is not yet clear. However, the marked variation in temperatures, evident from the differences in bone colouration and the suggestion that the remains were not fresh when burnt, may indicate either that the burning of the human remains was not the main objective but was co-incidental, or that it was intentional, but the technology of pyre cremation was not well understood, and/or, there were insufficient quantities of suitable fuel, quite possible in a desert environment.

Burnt and non-burnt bones were not kept separate during the recovery process, and the relative proportions of each have been roughly calculated for the archaeological units where burnt bone is present. Burnt bone was found in Section 1 Level 3, where approximately 50% of the bone was burnt; Section 1 Level 4, where approximately 10% of the bone fragments were burnt; and Section 2 Level 3-4, which had 50% of burnt bones. These findings correspond to two areas of burning: a small area at Section 1, and a larger area covering parts of Section 2 and 3.

Method of burial

Although some partially articulated skeletons in the upper layers of the tomb were noted by the excavation team, the mainly commingled nature of the remains led to the initial conclusion that the primary purpose of the pit-grave was to act as a ossuary, probably designated to house the cleared remains which were first placed in the up-standing circular tomb. Several matching and articulating bones from all levels were noted during the osteological analysis. The current excavations of the section left *in situ*, still in the upper layers of the depth of the deposits, have revealed at least 16 partially articulated individuals. The preserved joints include parts of the hands and feet, which have relatively tenuous joints, which are normally the first to decompose. The presence of these bones still in articulation strongly suggests that, at least in the upper levels, primary burial occurred (Figure 9). However, three ribs belonging to a juvenile, found during the original excavations in Section 4 Level 6, i.e., the bottom of the tomb, which had become fused by *post mortem* concretion and soil while still in their original anatomical position, indicate that at least some primary burial occurred from the beginning of the use of the tomb.

The current excavations also clearly show that, while there were some articulated remains, the majority in the pit were in a disarticulated state. How they became disarticulated is not clear. These may represent secondary burials, or, as there was no obvious means of clear access into or inside the tomb, they may simply have become disturbed during the deposition of further bodies.

Figure 9: Tomb N, Hili Gardens – Articulated skeleton *in situ*

Numerous artefacts were deposited along with the dead. There were at least 450 complete pottery vessels as well as over 250 rimsherds, 38 chlorite vessels, several alabaster vessels, copper rings, one of which was found on a proximal phalanx of the hand, and necklaces of carnelian, two lapis lazuli beads, and several silver beads (al Tikriti & Méry, 2000).

3.2. Methods

Although both populations were examined primarily for the purpose of establishing connections between health and diet, in order to place the results into a meaningful context, full macroscopic osteological assessments were carried out.

Unless otherwise indicated, methods of ageing, sexing and the calculations of stature are based on those outlined by Bass (1995), the identification of loose teeth and assessment of dental age on van Beek (1983), and the ageing of foetal and neonate remains on Fazekas and Koza (1978). Other methods, where used, are discussed below.

Metrical analysis, unless otherwise stated, was only conducted on intact bones and has been restricted to those measurements that would provide meaningful information. For example, although an interminable number of skull measurements can be taken, where the skull was sufficiently intact, only the following measurements have been taken of the skull: maximum length, maximum breadth, maximum height, porion-bregma height, minimum frontal breadth, facial height, upper facial height, facial width, nasal height, nasal breadth, orbital height, orbital breadth, palatal length, palatal breadth, maxilloalveolar length, maxilloalveolar breadth, bicondylar breadth, bigonial breadth, height of ascending ramus, minimum breadth of ascending ramus, and the height of the mandibular symphysis.

Postcranial measurements for the purpose of assessing age, sex or stature are largely based on the standards outlined by Bass (1995), who reproduces studies by various authors. The ageing of infants and children was based on a combination of dental development, as outlined in van Beek (1983), the degree of skeletal maturity, and long bone length. The ageing of adult remains by the degree of dental attrition is based on the system devised by Brothwell (1981). However, it is acknowledged that Brothwell based his system on British Neolithic to medieval populations, and because of possible dietary differences, may not directly relate to either of the populations studied here. His standards are used for comparative purposes only, to provide a 'dental age' and not a true age at death.

The following age classifications have been adopted:

Age Classification	Age Range
Foetus	
Neonate	birth to 3 months
Infant	4 months to 4 years
Child	5 to 11 years
Adolescent	12 to 16 years
Young adult	17 to 35 years
Middle aged adult	36 to 45
Old adult	45+

Figure 10: Age classifications used.

In recording pathological lesions, the emphasis has been to describe the lesion rather than diagnose the disease (Ortner, 1991), except in some obvious cases such as mal-united fractures

In an attempt to reduce observer error some of the results were checked by the author. The methods of scrutiny used included a 100% check of all measurements, the random re-examination of bags of sorted bones and the full re-examination of a skeleton or bones from an archaeological unit when it was thought that an error may have occurred.

Basic statistical analysis of the results of the anthropological analysis has been carried out. This involved the calculation of frequencies, percentages, averages, ratios, etc. Where appropriate, the results have been presented in frequency tables and bar diagrams.

While it is acknowledged that other analytical methods, such as assessing age based on trabecular bone loss, or the microscopic examination of tooth root transparency, can be utilised, with the exception of radiographic investigation to establish whether Harris' lines were present, or to assist in the assessment of trauma, this study has been confined to the most common method used, macroscopic examination. Non-metric variation, although recorded when identified, is not discussed in this paper.

The nature of the material from the two sites is very different, and so it has been necessary to deploy different methods for gathering information and hence for reproducing the results. The specific methods used for each body of material are discussed below.

Schela Cladovei

The Schela Cladovei remains, mostly consisting of discrete articulated skeletons, which had been excavated and stored as whole units, allowed for the examination of complete or almost complete individuals. Information was recorded in full in narrative form. Each bone was examined, its morphology and degree of completeness described, measurements taken, and any evidence of disease or skeletal anomaly described in detail. As far as possible, fragmentary bones were reconstructed. A précis of the findings for each skeleton is attached at Appendix 1. The data in Appendix 1 is collated in Appendix 2. In addition, separate summaries of adult stature, pathological lesions, and dental evidence can be found in Appendices 3-5.

The ageing of immature skeletons was based on the lengths of long bones and the state of development of the dentition. Adolescent age was based on the degree of epiphyseal fusion and dental development. Adults were aged by observing the state of skeletal maturity and, where possible, the morphological changes of the pubic symphyses. A "dental age" was also assigned on the basis of the degree of attrition on the teeth, using the standards developed by Brothwell (1981), which while they may not be directly applicable to the Schela Cladovei population, provide a useful method of shorthand for recording purposes. Where the pattern of attrition was not covered by the Brothwell system, as in the case of anterior teeth, this has been described in full.

Further discussion of the ageing methods used and their reliability can be found in Chapter 5.

Establishing male sex among the Schela Cladovei population was fairly straightforward. The dimensions of the strongly sexually diagnostic male bones were well within the range for modern males. Assessing female sex was slightly more problematic. The dimensions of female bones were in general much greater than that of modern females. Frequently, the measurements of females were what would normally be considered to be sexually indeterminate, i.e., in between the normal for males and females, or, in many cases, within the lower end of the range for modern men. Female sex in these individuals was confirmed by the more reliable sexing method (see discussion in Chapter 5) based on pelvic morphology, and by comparison with the even more robust males. Female robustness was so striking that an isolated female skeleton without the pelvic bones and without male individuals for comparison could easily have been assigned male sex.

Calculation of stature was largely based on the method developed by Trotter and Gleser (1952; 1958). To obtain the greatest accuracy, estimations of stature were based on the combined lengths of more than one long bone where these were available and intact. In a few cases it was possible to use the humerus, femur and tibia, or the femur and tibia. Where this was not possible, either femoral or tibial lengths were used. Rarely, the less accurate upper limb measurements were utilised. In three cases stature was calculated using metatarsal bones (Byers *et al*, 1989). All of the calculations carry a range of error. The degree of accuracy depends on the bone used, but most calculations had an error range of 3-4 cm. In the three cases where stature was estimated on the basis of metatarsals the standard deviation was 6.74 cm. Appendix 3 gives details of the individuals for whom height could be estimated.

Tomb N Hili Gardens

Huge volumes of commingled fragmentary remains necessitated an entirely different methodology to that normally applied to discrete inhumations. It was decided to maintain the system used during excavation of dividing the tomb into arbitrary sections and layers, as, although such divisions, with the exception of perhaps Section 1, which may represent a later addition to the tomb, do not directly relate to different phases, at least not horizontally, this provided a suitable means of separating the huge quantity of bone fragments into more manageable volumes.

The bones from each archaeological unit were initially quickly and roughly sorted into the major areas of the body – skull, spine, shoulder and sternum, ribs, diagnostic long bone fragments, pelvis and hands and feet (combined), undiagnostic long bone fragments (mostly pieces of diaphyses) and unidentified fragments. The high degree of disintegration meant that the quantity of fragments belonging to one of the six long bones but which could not be assigned to a specific anatomical location, and unidentified remains in each area of the tomb was high. Each group of identified bones were then fully examined and sorted according to individual bone (Figure 11).

Figure 11: Tomb N – sorting foot bones, Section 4 Level 6

The resulting information, including a description of the fragment, assessments of age, sex, pathology, metrical analysis, etc., was recorded on a spreadsheet. Each archaeological unit was examined and recorded separately. To enable the registration of full detailed information specific to dentition, jaw fragments and loose teeth have been recorded on separate spreadsheets for the whole tomb. In order to gauge whether the fragmentation rate was greater in any particular area of the tomb, the combined material from each skeletal area (skull, spine, thorax, upper limbs, hands, pelvis, lower limbs, feet and general long bone fragments) and unidentified fragments was weighed and the weight recorded on a separate spreadsheet. All fragments in each category were counted with the exception of the unidentified fragments, which have only been weighed. Approximately 73 % of the total weight of bone was identified, at least to a general anatomical location. Over 100,000 fragments of bone were identified, and, although not counted, all of the unidentified fragments were examined, probably making the total number examined in excess of 130,100. Finally, the combined information on minimum numbers, age, sex, and pathology has been summarised on separate spreadsheets. All of these spreadsheets are attached as appendices.

The evidence for dentition was in two forms: fragments of mandibles and maxillae, and loose teeth. In most cases, teeth that had been *in situ* in the jaws at the time of death had fallen out of their sockets, and even when they had remained *in situ*, the crowns had become damaged. Two systems have been devised to record dental remains. For the jaw fragments, a method was formulated to enable the recording of either deciduous or permanent dentition, or both, in each fragment, and under each tooth position information about the status of the tooth was recorded as follows:

Code	**Key**
-	Alveolar area not present
0	Alveolar area present but information unclear
1	Tooth unerupted
2	Tooth erupting
3	Tooth present and undamaged
4	Tooth present but damaged
5	Tooth missing *post mortem*
6	Tooth missing *ante mortem*
7	Tooth congenitally absent[4]

Figure 12: Key to tooth status

[4] Although provision was made for the recording of congenitally absent teeth, no such teeth, whose absence can only be diagnosed by radiographic examination, were recorded.

In addition, assessments of age at death, either according to dental development or attrition (although there were few surviving undamaged teeth on which to score the degree of wear) and pathology were recorded.

For the loose teeth, the FDI System (Fédération Dentaire Internationale) was used (see van Beek, 1983), slightly adapted. Permanent teeth were given an identifying number from 1 to 32 and deciduous teeth a number from 51 to 70 as follows:

1) Permanent Teeth

1 2 3 4 5 6 7 8 | 9 10 11 12 13 14 15 16

R --------------------------------|-------------------------------- L

32 31 30 29 28 27 26 25 | 24 23 22 21 20 19 18 17

2) Deciduous Teeth

51 52 53 54 55 | 56 57 58 59 60

R -------------------------|-------------------------- L

70 69 68 67 66 | 65 64 63 62 61

Estimations of age based on development or wear, the presence of caries, hypoplasia and calculus were recorded for each tooth.

In order to identify the relative distribution of body parts and the degree of fragmentation in the tomb, the weight of each general anatomical unit and the unidentified fragments in each archaeological unit was recorded.

Finally the data for each archaeological unit was combined to give a total for the tomb, as a whole. Full details of the Tomb N remains are included in Appendices 6-33).

Assessment of minimum number of individuals

Calculation of the minimum number of individuals buried in the tomb was based on the most frequently occurring bone in each archaeological unit; this enabled a minimum number for that unit to be estimated. The minimum number for each unit was then combined to provide a total for the tomb as a whole. Account was taken of right and left sided bones, and where individual bones could not be sided a count of one half of the total was used. This figure was refined where clear differences of size, age or sex were visible. The utilisation of archaeological units, which have no clearly identified temporal or spatial significance, provide a convenient way of sub-dividing a rather large and unwieldy body of data into more manageable component parts. While there is a risk that using this method could result in some individuals being counted more than once, resulting in a possible overestimate, in view of the poor condition of the remains and the consequently high percentage of unidentified bones, it is more than likely that any final total for the tomb as a whole will be an underestimate. This supposition has been tested using the petrous part of the temporal bone. This bone component, as its name suggests, consists of dense compact bone, which survives well in archaeological conditions, often detached from the rest of the temporal, and is easy to side. The total for the tomb based on this bone (after adding the totals for each unit) was 407. Straight counts of right and left bones for the whole tomb were 346 and 365, respectively. However, in addition to the sided bones there were 137 fragments which were either too eroded to side or too fragmentary. This clearly confirms that using grand totals of each unit will not necessarily result in over-estimations.

Age at Death

The process for assessing age at death of the Tomb N population was, because of the dissimilar nature of the remains, very different to that for the Schela Cladovei population. Ideally, estimations of age at death, particularly that of adults, should be based on a consensus of different factors. For example, in assessing adult age one would take into account the degree of epiphyseal fusion, tooth wear, the degree of degeneration throughout the skeleton, etc., to enable an assessment (however imprecise) to be made. Some methods of ageing were not suitable for use on the Hili material. For example, the method of ageing by the degree of sternal-end ossification of the fourth rib, devised by M. Y. Iscan and S. R. Loth (as reproduced in Bass, 1995), could not be used because of the difficulty in identifying the fourth rib from fragmentary commingled remains. Similarly, ageing using the morphological changes of the auricular surface (as introduced by Lovejoy *et al.*, 1985) was not used because, although in a few cases the auricular surfaces had survived intact, in most cases they were represented by only small fragments. General estimates of the degree of cranial suture closure were recorded. Although, in general, sutures gradually become obliterated with age, the degree of closure is highly variable (see, for example, Buikstra and Ubelaker, 1994) and has not been used here in the assessment of age. The degree of dental attrition, although recorded where possible, was of very little help because so few teeth had survived. Methods of ageing used were largely the degree of epiphyseal fusion (although, with the exception of the few cases where the epiphyses were in the process of fusing, giving a fairly precise age at death, generally, only an 'over' or 'under' age could be provided), the degree of dental development, and measurements of immature long bones (although in most cases only parts of the bones had survived and estimates of full length had to be made on the basis of the surviving portion of bone, usually a half or third of the full bone, providing only very rough estimations of age).

Because the volume, degree of fragmentation and commingling of the Hili remains made the reconstruction of individual skeletons an impossible task, the various ageing factors have to be taken into account in isolation. This causes several problems when trying to summarise age at death for the inhabitants of the tomb. Firstly, assessments of age must inevitably be less precise than those based on complete skeletons. Secondly, summarising the evidence for age at death from the commingled and fragmentary remains of a population is not only less accurate, but also more complicated. If, to give a simple example, in the case of immature remains, a summary of the estimations of age based on the degree of skeletal development were added to that for the state of dental development, it would be impossible to establish whether some individuals had been taken into account more than once. On the other hand, if only either skeletal or dental development were taken into account, the result would, in view of the very fragmentary nature of the remains, most likely be an underestimation.

To expand on this point, in Section 1 Level 3 petrous parts of the temporal bone gave a minimum number of individuals of 13. Right scapular fragments indicated the presence of at least 4 individuals over 18 years. Two left clavicles were from children aged about two. Ulnar bones indicated the presence of two foetuses and an individual who was either a foetus or neonate. There was at least one child about 3-4, again indicated by ulnar remains, and the remnants of a femur and ulna indicated that there was an older child present, who was probably aged about 10. This gives a total of 11 individuals based on other remains when evidence of age at death is taken into account.

Information from the dental remains however gives a slightly different picture. Present were two children aged about 3, another aged about 4, one aged 5, one aged 11 and at least 6 adults. Combining the two sets of data, and discounting those individuals who may be represented by both skeletal and dental remains, and also bearing in mind that any assessment of age will be very general, a total of 15 individuals is arrived at. The resulting information is presented in the following table.

Age at death	Skeletal Remains	Dental Remains	Minimum Number
foetus	2	0	2
foetus/neonate	1	0	1
2-4 years	3	3	3
c. 5 years	0	1	1
c. 7	0	1	1
c. 10-11	1	1	1
adults	4	6	6
Total	11	12	15

Figure 13: Tomb N – Age at death Section 1 Level 3

The above example illustrates the importance of taking into account as much information as possible.

A further problem arises in the collation of the individual datasets. To provide meaningful analyses of age at death it is necessary to group individual results in broad categories. However, the age span for individual bones varies, depending on the bone, and these often do not necessarily easily fall into these broad categories. For example, four age groups have been used for children: foetal/neonate (up to 3 months after birth); infant (4 months to 4 years), child (5 to 10 years) and adolescent 11 to 16 years). On the basis of a mandible where dental development suggested an age of 4 to 5 years an individual could be placed in either the infant or child group. In such cases a choice between groups has had to be made. Some information on aging has had to be left out because of the vagueness of the assessment. This largely applies to cases where the individual is probably less than, say, eighteen because the head of the femur is unfused, but a more accurate assessment is not possible.

Assessment of Sex

The same problems encountered with ageing affected the assessment of sex, that is, that sex could only be determined from isolated bones, whereas, ideally, when assessing the sex of an individual, information from various parts of the skeleton would be taken into account to arrive at a consensus. The reliability of the assessment varies depending on the bone and the methods used, and some determinations will be less accurate than others. The most dependable bone for sexing is the pelvis (Mays,1998; Mays and Cox, 2000). However, the Tomb N pelvic remains were extremely poorly preserved, and other, less reliable, parts of the skeleton have had to be utilised. The presence of so-called parturition scars, although few, have been recorded where noted. However, their reliable association with parity and indeed sex, has been called into question (Cox and Scott, 1992) and their presence or absence has not been used in the assessment of sex. The degree of fragmentation of the remains has determined the methods utilised for assessing sex, and in the case of the Hili remains has therefore been primarily assessed on the basis of the dimensions of the heads of the femur and humerus, the length of the glenoid cavity of the scapula, the length of the clavicle, and the epicondylar width of the humerus. Unfortunately, there is a large margin of error with all of these methods, and although the area of bone had been preserved, in many cases the sex of the individuals could not be established because they fell between the ranges for males and females. Some features of the skull did appear to be sexually diagnostic, and although an accuracy of 80% has been claimed for sexing of the basis of the cranium without the mandible (Mays and Cox, 2000), on the basis of only isolated parts of the cranium such as the brow ridges or mastoid processes, the degree of accuracy must be much lower. However, in view of the lack of sexually diagnostic evidence, cranial morphology has been utilised here.

A further problem arises when trying to summarise the number of males and females present. Sexually diagnostic information noted during the examination of the material was collated for each of the archaeological units, and a summary provided for that unit. Unfortunately, it is not possible to ascertain whether the same individual has been included more than once. If, for example, the dimensions of the femoral head indicated that there were at least 5 females and 4 males in a unit, and scapular measurements suggested 4 females and 3 males, it possible that 9 females and 7 males were present. On the other hand, the 4 females and 3 males identified from scapular remains may already have been represented by femoral heads, and the total number present no more than 4 females and 3 males. In circumstances such as this the minimum number has been used.

In most archaeological units, the head of the femur was the most frequently occurring sexually diagnostic area surviving, and it is these dimensions that largely govern the conclusions on sex. Unfortunately, some of the remains, including femoral fragments, from Section 4 Level 6 went missing before they could be fully examined and it has not been possible to include this information. In this unit, therefore, information of sex has been based on the morphology of areas of the skull. The remains in Section 1 Level 4 were so poor that no information on the sex of the individuals contained in this level could be extracted.

Stature

The most frequently used method of calculating adult stature is that based on the length on the long bones, developed by Trotter and Gleser (1952, 1958). However, this method requires that measurements be taken from complete bones. The general disintegration of the Hili remains resulted in the almost complete absence of intact limb bones; only three radii (Section 2 Level ¾) from the many hundreds which should have been present (over 1400 based on the minimum number of adults estimated to have been deposited in the tomb) had survived in a state that enabled maximum length to be calculated.

This virtual absence of complete and measurable long bones made the assessment of stature problematic. In an attempt to overcome this difficulty, and despite the fact that any results based on other methods are liable to be less accurate than assessments based on complete long bone length, three other techniques were considered, namely those based on fragmentary long bones (for example, Steele and McKern, 1969), metacarpal lengths (Musgrave and Harneja, 1978) and metatarsal lengths (Byers *et al.*, 1989).

The first method considered was that using fragmentary long bones. Steele and McKern (1969) utilized as the basis of their study, a sample of 117 prehistoric American Indians from various archaeological sites. They established regression formulae for segments of the femur, humerus and tibia, based on defined landmarks on each bone, for both males and females, to enable total long bone length to be estimated. Formulae based on the combined data for males and females were also produced, useful for segments of bones where sex cannot be established. Standard error ranged from 0.13 cm to 2.11 cm, depending on the bone used and whether the sex of the individual was known. Once full bone length has been estimated, stature can be calculated in the normal way. Clearly the combined results of both procedures would result in a greater margin of error and less accuracy than that based on intact long bones.

The fragmentary long bone technique was rejected. Primarily, because a large proportion of the long bone remains were too fragmentary even for this method.

(Most of the Hili long bones had survived only as splinters or small sections of the diaphyses and detached ends, and the volume of the material made any contemplation of reconstruction unreasonable.)

The metacarpal method devised by Musgrave and Harneja (1978) was established on radiographs of living individuals, 120 males and 46 females, predominantly white, aged between 17 and 87, and all patients at the Accident Department of Bristol Royal Infirmary who had presented with minor hand injuries. The inter-articular length of each metacarpal was measured and a significant correlation co-efficient between length and living stature enabled regression equations to be calculated for each metacarpal, left and right, for males and females. The study found that estimates using this method varied from more conventional methods (i.e., those based on long bone length) by less than 3%. This 3% variation means a difference of 4.45 cm at a height of 152.40, to 5.72 cm at 187.96 cm. However, as calculations of stature based on long bone length have a standard deviation which varies from about 3 to 5 cm, depending on which long bone is used, the degree of accuracy could be out by as much as 8 cm to 11 cm.

Byers *et al.,* (1989) carried out a study to determine the value of using metatarsal length in the calculation of living height. This exercise was based on a sample of 130 macerated and dried skeletons, where details of age, sex and race were known. The lengths of all ten metatarsals and that of the complete cadaver were measured. Significant correlation coefficients between the two were shown, and simple and multiple regression equations computed. Standard errors of estimated stature ranged from 39.9 to 76.0 mm. Regression formulae for each metatarsal (including two for the fifth metatarsal, for both functional and total length) for all individuals, all males, all females, Euro-American males and females, and Afro-American males and females were produced. The resulting formulae did not differentiate between right and left bones.

Survival of a large number of intact hand and foot bones made these two methods the preferable options. Both methods were tested. Initial confusion over the metacarpal method was clarified once it was realised that the formulae included a combination of millimetres and centimetres. For example, the formulae for the left first metacarpal for a male was 1.69 Met + 94.76 cm, i.e., 1.69 times the length of the first metatarsal plus 94.76 cm. For the formula to work the length of the metacarpal needed to be measured in millimetres, despite an addition being made in centimetres. However, it was decided that this method was not suitable for use with the Hili material because, having only isolated metacarpals, the sex of the individual was not known and no formulae was given for all individuals.

Because it allows for estimations of living height to be made, albeit with a wide margin of error, even where the sex of the individual is unknown, calculations of stature for the Hili population have been based on the metatarsal technique. [5]

To avoid the possibility of one individual being included more than once, it was decided to use only one metatarsal. The right first metatarsal has been selected because this was the most frequently occurring bone. (The survival rate for first metatarsals was much greater than any other, presumably because they are sturdier and so less liable to fragment.) Fortuitously, according to Byers *et al.,* (1989), this bone has, along with the second metatarsal, the lowest standard error for combined data on sex and race than any of the metatarsals. Despite being the most frequently occurring complete metatarsal, stature could only be calculated for 46 individuals of 15 years or over, only about 20% of the estimated number of adults buried in the tomb.

However, although the fact that rough estimations of height can be made without the sex of the individual being known may be convenient for calculating the stature of individuals, it is of even more limited value when trying to summarise the results for the Hili population as a whole.

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[5] The ratio of surviving intact metatarsals was (from 1st to 5th) 85:25:26:29:34. In addition were numerous incomplete metatarsals, a large proportion with the heads missing.

CHAPTER 4. RESULTS OF THE OSTEOLOGICAL ANALYSIS

4.1 Schela Cladovei

Total number of individuals

A total of 62 burials were examined. These burials comprised complete and partial skeletons, and often more than one individual. Although most of the individuals were complete or almost complete skeletons, in some cases only articulated body parts were found. For example, some inhumations consisted of only leg bones (M55, M56 and M69). As these were found to be in articulation, they have each been counted as an individual. Stray isolated bones found in addition to articulated skeletons have not been included in the count of individuals. However, where an additional articulating body part accompanied an articulated skeleton, this has been counted. For example, M51 consisted of an almost complete adult female, minus the skull. She was accompanied by the pelvis, legs and feet of another adult female, the pelvis, legs and feet of an adult male, and a further pair of legs, who, based on femoral head diameter, probably belonged to an adult male. The count for M51 is therefore four individuals. Similarly, isolated skulls where they have been given an M number have been treated as separate individuals, even though they could have belonged to one of the skull-less skeletons. In total, there were seven isolated skulls, 6 of which were given M numbers, so it is possible that there has been an over-estimate of the numbers of individuals, although as there were 24 skeletons without skulls, the effects of any over-assessment is minimal. The total number of individuals examined from the 62 locations was 74.

Age at death

Age ranges were assigned to all 74 individuals, although in 24 cases (32%) all that could be said was that adulthood (i.e., full skeletal maturity) had been reached.

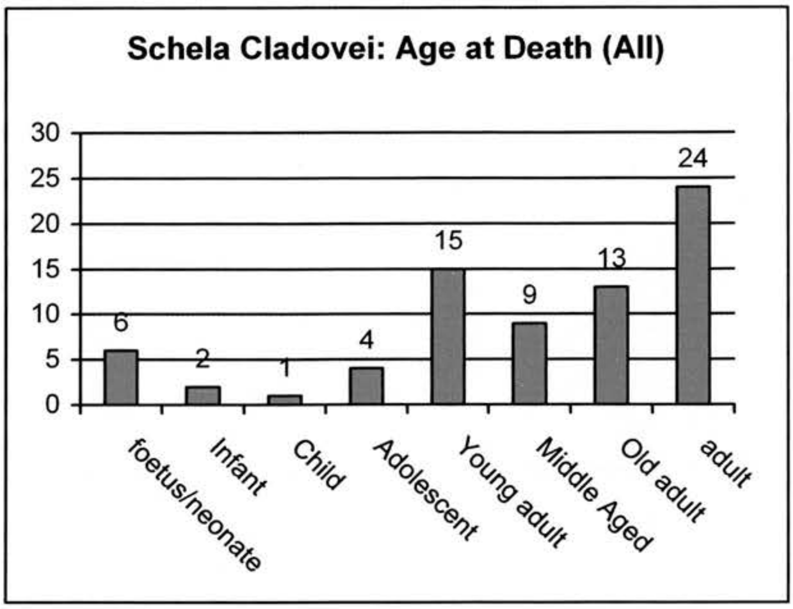

Figure 14: Schela Cladovei - Age at death, all individuals.

The above chart indicates the number of individuals in each age range. Sixty-one (83%) of the observed Schela Cladovei population had reached adulthood, while 9 (12%) were children, ranging in age from foetus/neonate to 11 years, and four (5%) were adolescent, aged between 12 and 16.

Children are relatively few in number; the greatest number in any one category (6) were foetuses/neonates, while there were 2 in the birth to 4 years category, and only one aged between 5 and 11. However, 15 of the 62 graves contained the isolated bones of children of varying ages, ranging from foetuses to 7-10 years. Although some burials of full immature skeletons were noted, the number of isolated bones of children suggests that the majority of them were treated differently at death.

Measurements of the long bones of almost all of the foetus/neonates were closest in size to Fazekas and Kosa's 10 lunar month male foetus (1978). Fazekas and Kosa's foetal age standards are based on modern Hungarian individuals and may therefore not directly relate to the Schela Cladovei population. Because they were of a size similar to a full-term foetus and as it is difficult to ascertain whether these babies had actually gone through the normal birth process, they have been classified as "foetus/neonate". There was a relatively high level of female deaths in the 17-25-age range (see below), which may have been linked to death during childbirth. However, death of the mother during parturition does not necessarily also signify death of the child, and as none of these children had been found buried in association with females of childbearing age, they may have been live births. (Only one was found in association with a female. However, she was over 45 [M38].) It is also possible that these babies had been stillborn, or that death occurred very soon after birth. The practice of infanticide is one further possibility that cannot be ruled out. One of these individuals (M 95-1) casts some doubt upon the relevance of Fazekas and Kosa's standards to the Schela Cladovei group. This child had long bone measurements that equated with a 10 lunar month male foetus. However, a fragment of left mandible with three crypts may have had one tooth, probably a central incisor, which had erupted, or was about to erupt. While, babies can be born with teeth already erupted, it is more common for the central incisors to erupt at about six months of age (Van Beek, 1983), and it is possible that the age of these apparent foetuses or neonates have been under assessed, and that they are older.

The isolated immature bones mentioned above have not been included in the count of immature individuals; only substantially complete skeletons have been incorporated. If they had been included, the percentage of children to adults would have been much higher. It is not clear how these remains came to be integrated in the graves of other individuals. It is possible that they were simply stray remains from earlier burials that had become unintentionally incorporated during the subsequent burial process, they may have originated from nearby burials and included in error during excavation, or they may have been deliberately added as 'grave goods'. However, not all of the additional remains were immature; many were adult. If the immature remains had been included in the count of the minimum number of individuals, for consistency, it would also be necessary to include the stray adults bones, possibly resulting in an overestimation. It has been decided, therefore, to confine the analysis of the Schela remains to complete or partially complete individuals and disregard any isolated remains.

So, relatively speaking, there were few infants and older children. It has been suggested that, in pre-vaccination days, mortality below the age of one year rarely fell below 25% and that only around half of all children born reached adulthood (Guy *et al.*, 1997). According to Patwardham and Darby (1972), the infant mortality rate in the Middle East in 1958 was 300 out of every1000 births. It has also been suggested that it is normal to find an increase in mortality between the ages of 2 and 4 years, associated with weaning (Lewis, 2000). In the case of the Schela Cladovei population, this could mean that once passed the neonate stage, infant mortality was low, or it could simply be that we do not have a true representation of infant skeletons, possibly because immature bones do not survive as well as adult remains. Or, as isolated immature (and mature) bones were often found with other burials, it is possible that some individuals received different burial treatment.

Of the 61 adults, fifteen individuals fell into the young adult category (25% of adults), 9 (15%) were middle aged when they died, and thirteen (21%) lived into old adulthood, i.e., beyond 45. However, as 24 (39%) of all adults could not be accurately aged, these results cannot be considered to be conclusive.

Fifty-four of the sixty-three adolescent and adult skeletons could be sexed. The following diagram (Figure 15) shows the age ranges of adult males and females.

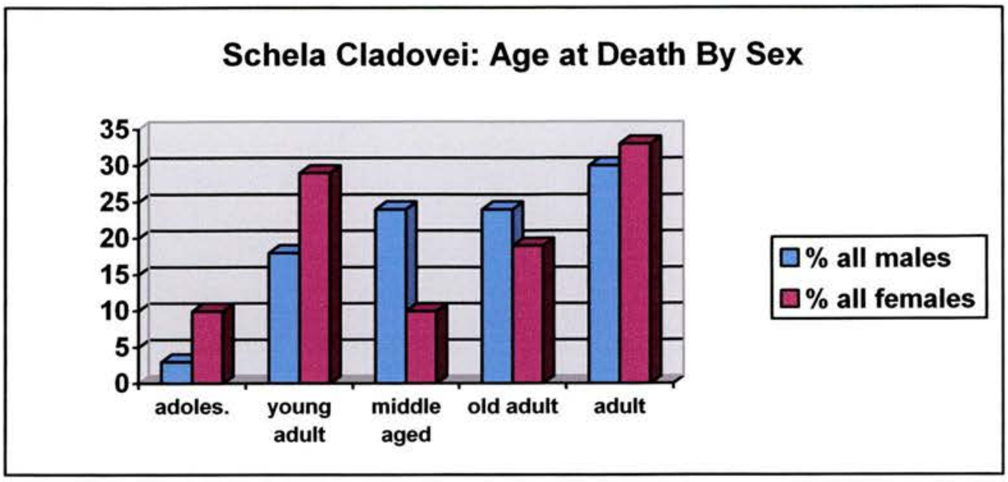

Figure 15: Schela Cladovei - Age at death, sexed individuals[6]

At least thirty-eight per cent of females had died before reaching middle age, and twenty-one per cent of males. The higher percentage of female deaths in adolescence or young adulthood could be related to death during or shortly after childbirth. The relatively high number of foetuses or neonates amongst the immature remains may help to add weight to this conclusion. A markedly higher percentage of males had died during middle age – twenty-four per cent of males, and ten percent of females. Some of these early male deaths may be related to the clear evidence for violence at Schela Cladovei. In four cases (M47, M50, M95/2 and M39) there is direct evidence, from embedded projectiles, that the males in question had met a violent death during middle age. A fifth male, who was probably around 20, had also died as a result of a projectile injury. This brings the total male deaths with conclusive evidence of fatal injury to 5, 15% of the total. This compares with only two females. Twenty-four percent of males and nineteen percent of females were in the old adult category suggesting that males had marginally greater longevity. However, a large proportion of both male and female adults, 30% and 33%, respectively, could not be accurately aged, and for that reason, these conclusions must be regarded as only tenuous.

[6] Assessments of the sex of the adolescents, who in all cases were around 16 years of age, was based, in the case of two of the females on pelvic and skull morphology and joint measurements, in the third female on the dimensions of the lower limbs, and, in the case of the single male, on general robustness.

Sex

From the total of 74 skeletons examined, 34 were males and 21 were females. There were 10 adults who could not be sexed, mostly because the skeletal remains were incomplete and the sexually diagnostic skeletal areas were not present. Sexing was not attempted for the 9 children.

The slight disparity between the number of males and females is probably not significant. In view of the marked robustness of the Schela Cladovei males, there is a very strong possibility that many, if not all, of the 10 unsexed adults were female. Furthermore, as the number of individuals examined is relatively small, the recovered individuals may not be representative of the natural composite parts of the population as a whole.

General Morphology

As is clear from the discussions on the assessment of sex, this was an extremely robust population. Both males and females had very well defined muscle attachments and sturdy bones, the dimensions of which were generally greater than that for modern males and females.

Ten skulls were in a condition sufficient to enable measurements to be taken. Based on measurements of cranial height, breadth and length, and the classifications reproduced by Bass (1995), all males (8 individuals) were found to be long-headed (dolichocephalic), a characteristic of early fossil man (Bass, 1995,71). Three out of four females had average (mesocephalic) craniums. Most individuals had high (hipsicranic) skulls. Both sexes had well defined brow ridges and strong muscle attachments, and broad, flaring mandibles (gonials); these morphological characteristics were even more marked in the males. Dentition was characterised by an edge-to edge bite (Figure: 16).

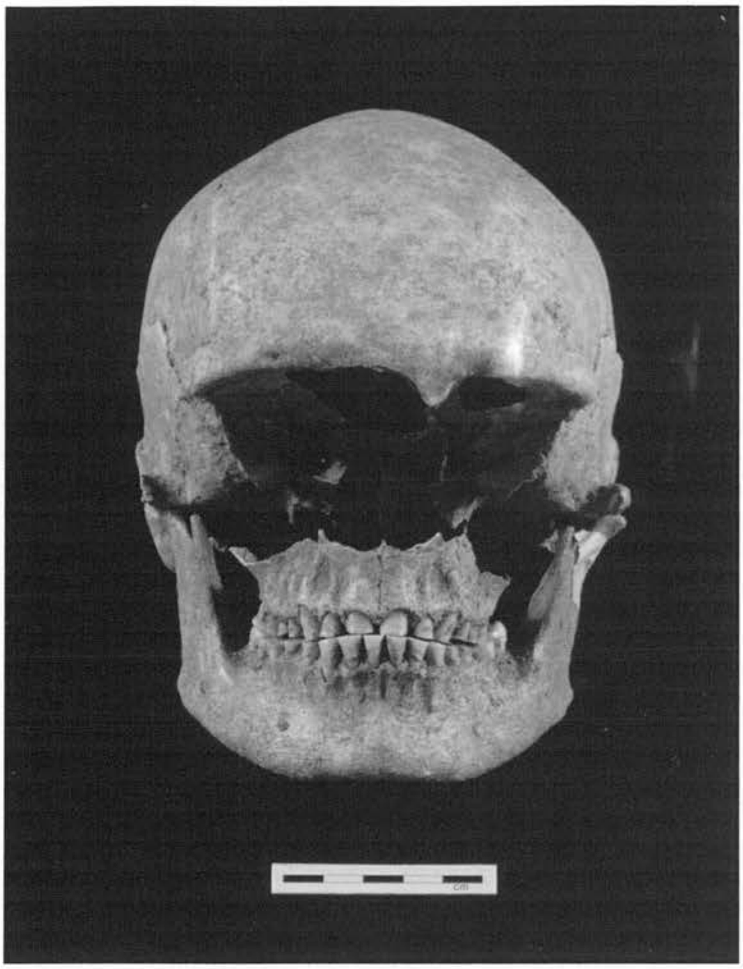

Figure 16: Schela Cladovei: Female skull (M42).

Stature

It was possible to calculate height for 29 males and 18 females. This was a fairly tall population. Mean height for all of the 47 individuals was 174.24 cm (5 feet 8½ inches). Male average height was 179.78 cm (5 feet 10¾ inches) with a range from 172.25 cm to 188.49 cm (5 feet 7¾ inches to 6 feet 2¼ inches). Average height for females was 165.31 cm (5 feet 5 inches) and the range was 154.00 cm to 172.31 cm (5 feet ½ inch to 5 feet 7¾ inches). The stature of the Schela Cladovei population is further discussed in Chapter 5.

Disease

The presence of disease was recorded where clear bony changes were visible. The diagnosis of conditions have largely been restricted to broad categories of disease, as shown in the table below. In some cases even a broad diagnosis could not be ascertained.

Pathological lesions were noted for 50 (69%) of the 74 individuals examined. Full details of the nature of the lesions are produced in summary form at Appendix 4 and in the individual skeletal reports (Appendix 1). The following table shows a brief outline of the broad types of lesions and the number of individuals affected.

Type of Disease	Males	Females	Sex	Total Individuals
Joint	17	9	1	27
Infectious	1	1	0	2
Congenital	0	3	0	3
Trauma	21	10	2	33
?	4	0	1	5
Dental	4	3	1	8
Metabolic	0	0	1	1
Hypoplasia[7]	1	1	0	2

Figure 17: Schela Cladovei – pathological lesions by type.

Joint Disease

Extensive joint disease was noted. Both arthritis of the major joints and spinal degeneration, in some cases indicated only by the development of osteophytes around the vertebral bodies (although considered by some not to be arthritis *per se* because of the lack of other indicators of the disease such as eburnation (e.g., Rodgers & Waldron, 1995)), was included in this category. The general diagnostic criteria for joint disease was the presence of marginal lipping and/or eburnation. More males than

[7] Hypoplasia is shown separately to dental disease to emphasise the fact that its presence may not be part of a disease process, but may be simply be a manifestation of skeletal stress.

females were affected. Seventeen of the 34 males (50%) had joint lesions and 9 of the 21 females (30%). The presence of such lesions can be due to a number of causes, including degeneration associated with increasing age, trauma, occupation, body weight and genetic predisposition (Waldron, 1994; Rogers & Waldron, 1995; Roberts & Manchester, 1995). The prevalence of osteoarthritis "increases markedly with age" (Rodgers & Waldron, 1995, 32) and it is possible that the higher incidence in the Schela Cladovei males is partly related to their slightly greater longevity. It is also generally accepted that occupation plays a part in the development of the disease (Merbs, 1983; Waldron, 1994; Rogers & Waldron, 1995; Roberts & Manchester, 1995; Jurmain, 1999) and, although these authors highlight the difficulties in and dangers of trying to relate arthritic lesions to specific activities, the higher incidence found among the Schela Cladovei males could also be occupationally related. Arthritic changes can also occur secondary to trauma (Apley & Solomon, 1988; Adams & Hamblen, 1992) and the greater prevalence may also be associated with the higher occurrence of trauma among males.

Figure 18: Schela Cladovei – vertebral pathology (M42)

Infectious disease

Evidence of infection was noted in two cases. An incomplete skeleton (much of the upper body was missing, including the skull) of a young adult female (M3, 1982) had osteomyelitis of the right tibia. This bone had two sinuses on the lower shaft, indicating that the bone interior was abscessed, and generalised thickening of the diaphysis. Apart from some slight degeneration of the joints, no other pathology was noted. The most likely cause is bacterial infection carried in the bloodstream from an area of initial infection (Roberts and Manchester, 1995, 127).

The second case was one of extensive (bacterial?) infection in the almost complete skeleton of a middle aged male (M96/8) who had numerous pathological lesions. Remodelling of bone in the maxillary sinuses was present. Two right ribs were thickened and pitted on their external surfaces and along the costal grooves on the internal surfaces, periostitis was visible on three left lower ribs, and there was an area of pitting on the external surface of the cranium over the superior part of the frontal and parietals. This individual also had healed fractures of a right and left rib and a first terminal phalanx, extensive ligamentous damage on both feet, and there was a possible dislocation of the acromioclavicular joint. Loss of anterior height was also visible on the twelfth thoracic vertebra, although whether this was traumatic in origin or related to the extensive degeneration of the neck and lower thoracic and lumbar spine is not clear. This unfortunate man also suffered from arthritis of both elbows, the left hand, the right knee and both feet. It is not clear whether any of the three types of disease present - joint, infectious and traumatic - are related. Infection can have a traumatic origin, although in this case the fractures appear to be old.

Congenital disease

Three cases of spina bifida occulta were noted, all in females (M3, 1982; M19; and M96/1). Only the inferior part of the sacrum was involved in all three cases. This is a fairly common anomaly and was probably asymptomatic (Roberts and Manchester, 1995, 36).

Trauma

The frequency of trauma was extremely high, especially among the males. Sixty-two percent of males (21 out of 34 individuals) had evidence of at least one injury, and many had experienced several. The incidence in females, although less than males, was also high at 48% (10 out of 21 females). The majority of injuries were fractures of the long bones, ribs, skull, hand bones, foot bones and vertebrae. Most of these were old, healed fractures, although in a few cases they appeared to have occurred around the time of death. Also common were injuries from bone and flint weapons, most of which were still embedded in the bone, ensethopathic lesions, dislocations, and Schmorl's nodes, which may have a traumatic origin.

Many of the traumatic injuries were clearly violent in origin. The evidence for this violence took the form of both fatal wounds caused by bone and flint projectiles, most of which were found still embedded in the bones, and a high level of healed and perimortem fractures. The presence of embedded projectiles at Schela Cladovei is highly significant, because, until now, most of the evidence for Mesolithic and Early Neolithic warfare in Europe has been in the form of indirect archaeological evidence, such as the presence of weaponry. With the exception of a few cases of embedded arrowheads from Russia and Denmark, until now, there has been little direct evidence from skeletal remains in Mesolithic Europe.

In total, eight skeletons (14% of the total number of adults examined) had embedded projectiles. The following is a summary of the individuals affected:

1. The bones from M1 bis, from the 1967 excavations, consisted of the mixed remains of two individuals, both of whom were female. One was aged between 16 and 23; the other was adult, probably of advanced years. Some of the bones could not be specifically assigned to either of the individuals. A lower thoracic vertebra (probably the 11th) had an embedded bone point. The direction of entry was from front left, and in a downward direction. There was no evidence of healing of the bone around the projectile. Part of the tip had sheared off but would have invaded the spinal column. A flint point was found in a lumbar vertebra. Entry was from

the front, slightly to the right and in a downward direction. The two bones with embedded projectiles probably belonged to the older adult female. A further thoracic vertebra, also probably from the older female, had damage which appeared to have been caused by a projectile. This had probably been lodged in the intervertebral space and was no longer present. The point of entry appeared to have been from the front. The lack of healing around the wounds and the fact the at least one had entered the spinal column indicates that these injuries were probably fatal.

2. Another group of bones from the 1967 excavations (labelled "Complex Epi") contained the mixed remains of two males, one of whom was aged between 20 to 25 (on the basis of epiphyseal fusion), and the other who was older, aged 35 to 39. An incomplete thoracic vertebra, belonging to the younger individual had a bone point protruding at the junction of the arch to the body. The other end of the bone point could be seen at the left anterior of the vertebral body. The point has entered from the front and slightly from the left and proceeded through the body of the vertebra horizontally. The tip of the point appears to have broken slightly. There was no evidence of bone remodeling, suggesting that the injury was fatal.

3. A middle aged male, excavated in 1989 (M39), had two embedded flint flakes, one in his left pelvis, and the other in his thoracic spine. No evidence of bone remodelling could be seen associated with either projectile and it was likely that these injuries, if not directly fatal, had occurred around the time of death.

4. A young female (M40), aged 15-18, had a composite weapon embedded in her left shoulder. The weapon consisted of a bone point with at least three flint barbs, all of which were embedded in the bone. The projectile had entered just distal to the humeral head in a lateral to medial direction. The remaining length of the point was 45 mm, of which 8 mm protruded on the lateral side and 5 mm on the medial side. The angle of penetration was from the left side and slightly from behind. There was no evidence of bone remodeling suggesting that the injury had occurred around the time of death.

5. A disarticulated fragment of thoracic vertebra from the 1992 excavations, found with an adult male (M45) and which may have belonged to the main skeleton, had a depression on the front edge of the bone, probably caused by a projectile. This is most likely to have been lodged in the intervertebral space and become dislodged when the soft tissues decayed. The point of entry was from the front and slightly from the left. There was no evidence of bone remodelling.

6. A fragment of the posterior part of a thoracic vertebra with an embedded bone point, 19 mm of which remained, was found with the skeleton of a male (M50), aged 35 to 45. It is not entirely certain whether this fragment belonged with the rest of the skeleton, as there were several additional fragments of bones found with the main skeleton. The point appeared to have entered the body from the back, slightly to the right and horizontally (assuming a standing position). The tip had broken off but would have penetrated the spinal cord. There was no sign of bone remodelling. This skeleton also had a mal-united fracture of the right ulna and a healed fracture of the fibula, both of which were old injuries.

7. Associated with the skeleton of the young adult male (M47), aged 25-26, were two small fragments of vertebrae with embedded flint flakes. It cannot be stated with any degree of certainty that these fragments belonged with the main skeleton. There was no evidence of bone repair around the embedded flakes.

8. M95/2 was male aged 35-45. Later features truncated this skeleton and the lower legs, feet, left humerus, both lower arms and hands were missing. There was an embedded bone point in the left ischium with about 28 mm of a bone point protruding, and a roughly equal length embedded. The point of entry was from the left and slightly to the front of the femur, just skimming the femur about the point of the greater trochanter, where a slight indentation could be seen. A hole made by a similar bone point of the same dimensions could be seen superior to the first. A radiograph showed that the second point had penetrated 30 mm of bone and had been quite cleanly removed. The point of entry was from the back and slightly downwards. The bone projectile had penetrated the acetabulum and a

corresponding depression could be seen on the head of the left femur. The upper shaft of the right humerus also had an embedded bone point, which had shattered the bone on entry. The point had fallen out when the bone was being prepared for cleaning, but its impression could be clearly seen in the soil inside the bone. The point of entry was from behind and slightly upwards. Small pieces of what appeared to be flint were found embedded in the left clavicle at the attachment for the costoclavicular ligament. There was also a small piece of flint visible in the anterior surface of the first thoracic vertebra. This individual also had a *peri-mortem* fracture of the skull. There were no clear indications of what might have caused this fracture, but as there was a further bone point found adjacent to the skull it is possible that a projectile also caused this injury, although it is may also have been caused by a blow from a blunt instrument. There was also a hairline fracture of the right scapula, below and parallel to the scapular spine, terminating in a small round depression at the shoulder end. This could have been caused either by a projectile (although in view of the other injuries one would have expected that a projectile would have gone clean through the bone, which is quite thin at this point), or a blow with a pointed object. So, this individual had been injured by projectiles several times and had two *peri-mortem* fractures, which may also have been projectile injuries. As we do not have the complete skeleton it is possible that he also had other injuries in addition to those noted. There were no signs of healing at the sites of any of these injuries so they must have occurred *peri-mortem*.

The discovery of embedded projectiles in several skeletons from the Iron Gates was discussed by Boroneanţ and Plopsor (1990). They describe four cases from among fifty-three skeletons, from the sites at Schela Cladovei and Icoana (in the Lower Gorges on the Romanian side of the Danube). As details of the affected individuals are not given in the paper, it is not clear which of the embedded projectiles came from which site, and whether any of these cases are included in the examples mentioned above.

It cannot be said for certain that any of the above mentioned injuries were *in themselves* the direct cause of death. In several cases the spinal cord had been penetrated. Complete transection of the spinal cord of the thoracic or lumbar region would result in paraplegia. Partial transection would result in partial sensory or motor loss below the level of the injury (Apley and Solomon, 1988). Traumatic spinal paraplegia can be fatal, even today (Adams and Hamblen, 1992). However, it is unlikely that in any of the Schela Cladovei cases where the spinal cord had been invaded, that complete transection had occurred. Although such injuries could have resulted in death, especially if subsequent infection developed, such as that described by Schutkowski *et al.,* (1996) in an individual from a Single Grave Culture burial from Lower Saxony, more relevant would be associated damage occurring to the vital organs, especially if the direction of penetration was from the front. Roberts and Manchester (1995) discuss the impact of two penetrating injuries to the spine. In the case of an arrowhead lodged in a lumbar vertebra, which had entered the body from the front, death would have occurred within minutes because of massive blood loss resulting from perforation of the aorta, while the effects of an arrowhead embedded in the posterior part of a lumbar vertebra in another individual, would have been pain, bleeding and a minor opening in the spinal canal. However, in the absence of any bone remodelling in these cases, said to be observable after three weeks (Buckley, 2000), it can be concluded that the injuries in question, if not directly fatal, must have occurred around the time of death.

In addition to projectiles embedded in bones, Boroneanţ and Plopsor (1990) discuss at least four bone points and five flint flakes found with, or adjacent to, five human skeletons. Similarly, loose projectiles were found associated with skeletons in the later series of excavations at Schela Cladovei. When such artefacts are discovered in graves they are usually interpreted as grave goods. However, it is possible that some of these, if not all, had been embedded in soft tissue, and that the number of individuals who had died as a result of such violent injuries was greater than that indicated from the evidence from the skeletal remains.

Besides projectile injuries, there was a high level of other traumatic injuries. Four individuals had old transverse fractures of the radius and/or ulna, which may have been so-called 'parry' fractures. According to Adams, fractures of the shafts of the forearms may be caused by either "an indirect force such as a fall on the hand, or a direct blow" (1992, 145). However, Apley and Solomon (1988, 262) make a distinction between the two causative actions by stating that spiral fractures of the radius and ulna are caused by a "twisting force (commonly a fall on the hand)" while "a direct blow causes transverse fractures at the same level" (Apley and Solomon, 1988, 262). As all of the fractures in question were transverse, it is quite possible that were sustained as a result of interpersonal violence. However, Jurmain (1999) cautions that the tendency to interpret forearm injuries as evidence of interpersonal violence is too simplistic. Six individuals had healed skull fractures and there were two instances of *peri-mortem* fractures. The trauma rate for the population in general was high; 22 of the 61 adults examined (36%) had healed fractures. While some of these would have been the result of accidental injury, it is highly likely that some, especially the possible parry and skull fractures, were the result of violence (Figure 19). [8]

Figure 19: Schela Cladovei un-united possible 'parry' fractures of the radius and ulna with the subsequent development of a pseudo joint (M46).

[8] The question of the incidence of trauma at Schela Cladovei is not pursued further in this thesis. A wider study of the implications of traumatic injury and its association with interpersonal violence and warfare, both at Schela Cladovei, in particular, and in the European Mesolithic as a whole, is currently underway and will be published jointly by J. C. Bonsall, V. Boroneanţ and K. McSweeney.

Diseases of unknown origin

There were several lesions of unknown aetiology. M56, an adult male, had a small area of reactive growth on the left tibia, possibly the result of a minor trauma. A male, aged 25-30 (M96/2) had noticeable asymmetry of the 7^{th} cervical and the 1^{st} thoracic vertebrae with unusual formation of the lower thoracic and upper lumbar spine. Platelets of laid down bone with pitting were present on the external surface of the cranium, the right orbit and right malar of an infant, aged about 5 months. One individual (M46), a middle aged male, had partial fusion of the axis and third cervical vertebra. Whether this was traumatic or congenital in origin was not clear. Hyperostosis was present on the iliac crest, greater tuberosity, the inferior edge of the ischiopubic ramus, and pectineal lines of both pelvic bones, belonging to an older adult male (M2, 1968). Pitting was visible on the external surface of the cranium of an adult male who was over 45 (Largirea 1,55). This individual also had a healed skull fracture, a healed fracture of the left ramus of mandible associated with complete destruction of the mandibular head, and severe periodontal disease with extensive infection, and the pitting of the cranium may have been associated with one of these conditions.

Dental Disease

The dentitions of 32 adults were available for examination; more than half of these (*n* = 18) were full dentitions (see Appendix 5 for details). Generally speaking, dental health was very good.

There was no clear evidence that any of the individuals had lost teeth during life. One individual (M46) had an enlarged, infected socket for the upper right third molar, and no remaining tooth. It is not clear whether this tooth had already been lost by the time of death, or whether it was missing *post mortem*, as the mandible had broken into two halves at this point and the socket had not started to heal. The tooth could either have been lost *post mortem* or it may have been lost *in vivo* but shortly before death. Another individual (Largirea 1,55), who had extensive periodontal disease and several abscessed teeth, was missing the upper right lateral incisor and canine. There was extensive bone destruction on the external surface. However, the lingual part of the sockets were still intact, and as one of these teeth were found loose, it is likely that, despite the considerable infection present, they were both still *in situ* at the time of death.

Only three individuals (9.4% of individuals with dental remains) had carious lesions. One (M17) was a male of about 21 years who had a large mesial contact caries on the lower left M1. The cause of this carious lesion is not clear. All 32 teeth were present and none of the other teeth had carious lesions; the only other dental pathology noted in this individual was hypoplasia. Such developmental defects are known to predispose to caries attacks (Hillson 1986. p290). Another (M38), was an elderly female of at least 45 years who had a carious lesion on the occlusal surface of her upper left M1, which also had a large abscess at the root. Dental attrition in this individual was very advanced and the crown of the affected tooth had been almost completely worn away. It is very likely that the cause of the caries and the associated abscess was advanced attrition. The third individual (1983, SVI, Sq 10, 0.55), an elderly adult, had a small carious lesion on the occlusal surface of the lower right second molar (only the right mandible was present). This tooth also had gross, cupped wear.

Four individuals (12.5%) had dental abscesses. In one case, already mentioned above (M38), the infection appeared to be secondary to advanced caries. The other three (Largirea 1,55, M49 and M46) had pockets of infection associated with periodontal disease, detailed below.

Periodontal disease was only recorded in cases where alveolar bone loss was associated with evidence of infection; marked differences between the cemento-enamel junction (CEJ) and the alveolar crest, which can increase with age because of continuous eruption of the teeth (Hillson, 1996), without associated bony changes have not been classified as periodontitis. Five individuals (15.6%) suffered from periodontal disease. M49 was a 35-45 year old female who had moderate to severe periodontal disease. Resorption with associated pitting of the alveolar bone was in excess of 4.5 mm from the CEJ. Periodontal pockets were present around the upper and lower right first molars. M46 was a 35-39 year old male who had an average alveolar bone loss of 5.6 mm from the CEJ. The upper right third molar was missing, probably *post mortem*, with marked evidence of infection in the enlarged empty socket. Another, smaller, periodontal pocket was present around the lower left third molar. M1 (from the1982 series) was an elderly male of over 50. Pitting of the alveolar process indicates the presence of periodontal disease, although very advanced attrition precludes the accurate measurement of the alveolar bone loss. M44 was the isolated skull of an adult male, whose age was probably around 35 years, and who had alveolar bone loss of 3.5 mm from the CEJ and pitting of the alveolar process, indicating the presence of periodontal disease. The fifth individual, a male who was probably aged over 45, labelled Largirea 1,55, had an almost full dentition, with only two teeth missing, *post mortem*. There was advanced attrition and extensive evidence of periodontal disease in both the upper and lower jaws (see Figures 20, 21 and 22). Generalised pitting was present and on average about 4 mm of the roots were visible below the CEJ. Abscess pockets were visible on the external surface of the sockets of the lower second molars and at the base of the socket for the right third molar, and a massive abscess had destroyed the exterior bone surrounding the upper right lateral incisor and canine. Neither of these two teeth was still *in situ* but as the palatal sides of the sockets were still intact, they may have been in place at the time of death. In each of the five incidences, periodontitis seemed to be clearly associated with age, as all were in the 35-45 or 45+ range.

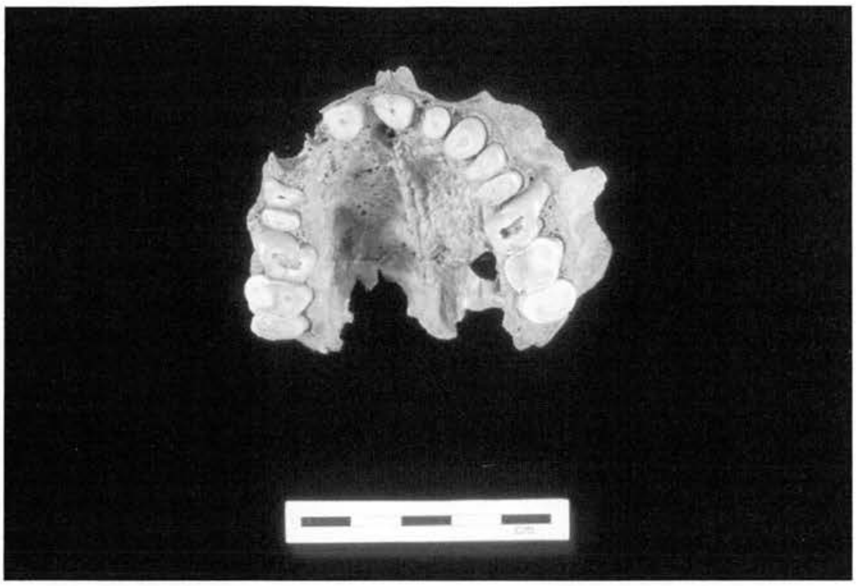

Figure 20: Schela Cladovei. Maxilla – view of the palatal surface showing severe attrition (Largirea 1,55)

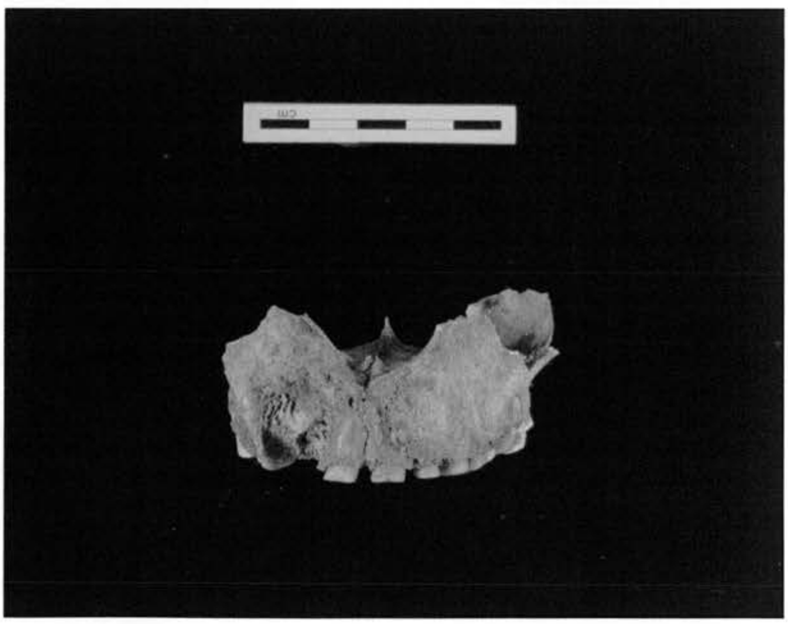

Figure 21: Schela Cladovei. Maxilla, anterior view, showing marked anterior attrition and pathological lesion on the right (Largirea 1,55).

Figure 22: Schela Cladovei – Mandible, occlusal view, showing severe attrition, pockets of infection at both second molars and destruction of the right head of mandible, possibly as a result of secondary arthritis following a fracture of the ramus (Largirea 1,55).

The majority of individuals suffered from calculus, of a moderate degree in most cases. According to Hillson (1996, 259), calculus is linked to poor dental hygiene and the consumption of carbohydrates. Hillson, in his 1979 paper, associated the development of calculus with a high protein diet (150). Lieverse (1999) in a review of the relationship between calculus and diet, accepts that "diets high in protein result in increased calculus production"(224), but cautions that the relationship is more complex and indirect that is normally acknowledged.

Attrition was often severe and uneven throughout the dentition. The first molars tended to be very heavily worn, and while first molars would be expected to be more heavily worn than the second or third because they erupt earlier, the degree was much greater than would normally be expected. In Figure 15 (M42) the very advanced wear of the lower first molars is just visible. A clearer view of the degree of attrition can be seen in the view of the occlusal surface of the mandible (Figure 23). The wear was often cupped. Anterior teeth were frequently much more severely worn than the posterior teeth; in many cases they were worn down to the roots. This wear tended to be greater on the lingual (tongue) surface. Figures 20, 21 and 22 show a case of advanced anterior tooth loss in both the mandible and maxilla of one individual (Largirea 1,55). This individual also has gross destruction of the left mandibular head, possibly secondary to a fracture of the ramus. This does not appear to have affected the pattern of attrition between right and left teeth and the trauma may have occurred after the wear was already advanced.

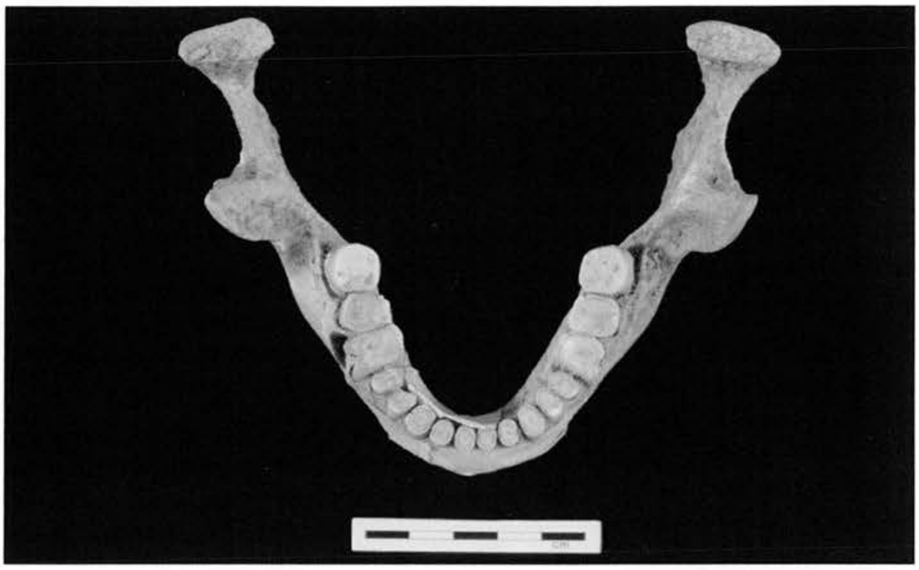

Figure 23: Schela Cladovei - Mandible occlusal surface (M42)

Metabolic Disease

In only one individual, a foetus/neonate (M33) was there possible evidence of disease that may have been metabolic in origin. The remains of this baby consisted of a fragmentary cranium, a few ribs, both humeri, and the proximal half of the left femur. Humeral dimensions were consistent with Fazekas and Kosa's (1978) 10-month female foetus, although, in view of the problems with applying modern standards to prehistoric populations, a younger foetal, or even neonate, age is possible. Pitting was present on the external surface of all of the thirteen cranial fragments as well as marked erosive lesions on the internal surface of some fragments. Reactive growth was also present on both orbits. Such lesions can occur in nutritionally related diseases such as scurvy, rickets or the anaemias, although in view of the age of this individual, such diagnoses are unlikely. It is possible that a genetically related condition was the cause here. Alternatively, the bony changes may simply reflect the normal apposition of bone.

Harris' lines, thought to indicate temporary cessations in skeletal growth, can also provided an insight into periods of illness or malnutrition during childhood. A sample of twelve tibiae, one from each of twelve adult individuals (M1, 1967, female, aged 16-23; M1, 1982, male, aged 50+; M3, 1982, adult female; M42, female, aged 45+; M46, middle aged male; M47, young adult male; M49, female aged 35-45; individuals 1, adult female, 2, male, aged 50+ and 3, adult male, of M51; M55, female, aged 16-17; M56, adult male) were radiographed for Harris lines, but none were noted. While there is a possibility that Harris lines had previously been present but had subsequently remodelled away (Vynanek & Stloukal, 1991; Lewis, 2000), it does appear that, apart from the high levels of joint disease and traumatic injury, the Schela population were healthy and robust. However, as pointed out by Wood *et al* (1992), it should not be assumed that a direct relationship exists between the presence of palaeopathological lesions and the health of a population. If this is so, then the converse should also be true – the absence of lesions do not necessarily indicate a healthy population. In other words, in the Schela Cladovei population, it is possible that those individuals who had been subject to periods of illness and malnutrition had not survived and that we see only those that had been unaffected. In such a case we would not expect to see high levels of pathological lesions.

There was very little evidence for nutritional stress or diet related diseases apart from two cases of hypoplasia. Dental hypoplasia, the result of disruption in tooth development, is thought to result from periods of malnutrition or disease during childhood. Hypoplastic pits were noted on the lower right canine and the first premolar, of a female aged about 18 (M16), occurring around 5 years of age. The other example was seen on a young adult male of about 21 (M17), who had hypoplastic lesions on the upper central and lateral incisors and lower lateral incisors, which had occurred when he was about 1 year of age. Approximate timings of hypoplastic lesions were based on the position of the lesion on the crown of the tooth, compared with van Beek's dental development chart (van Beek, 1983, 131).

4.2 Tomb N, Hili Gardens

Minimum Number of Individuals

The chart below indicates the minimum numbers obtained using different skeletal parts.

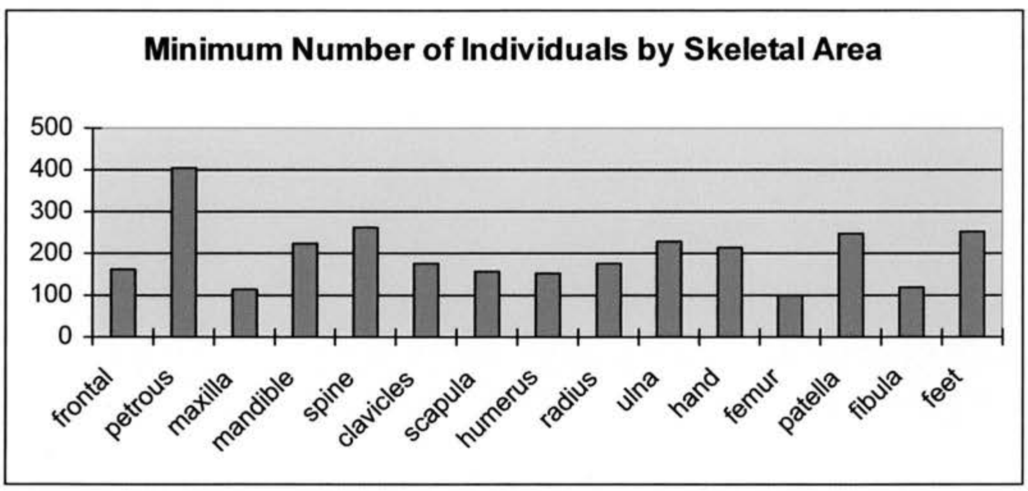

Figure 24: Tomb N - Minimum number of individuals

The above chart shows a marked variation in the minimum numbers obtained from various skeletal parts. By far the highest count is obtained from the petrous part of the temporal bone (407), while far fewer numbers are attained from all other bones. Some bones, such as the tibia, proved to be so ineffective in assessing minimum numbers, because of the degree and pattern of their fragmentation, that they have not been used. The next greatest counts are 264 from the spine (mostly based on the axis or atlas vertebrae), 252 from the feet, and 248 from the patella. The femur, ulna and mandible all gave similar results, with 229, 227 and 225, respectively. Hand and foot bones have survived much better than most of the larger bones. Many were found to be intact and produced fairly high counts in the assessment of minimum numbers (feet: 252; hands 215). This is probably because their small size and shape make them less liable to fragmentation, and they may have had a degree of protection by being able to filter down into small spaces. Minimum numbers were obtained by counting the most frequently occurring bone in an archaeological unit. Naviculars, first cuneiforms and first metatarsals were particularly useful for the feet, and scaphoids, capitates, hamates and first metacarpals for the hands. Not all hand and foot bones could be utilised, however. With the exception of the thumb and great toe, phalanges are difficult to side and to assign to a specific digit, and tali and calcanea tended to be more fragmentary than smaller tarsal bones.

Such variations in estimations of minimum numbers from the Hili remains may be due to a range of factors: recovery methods used, the varying fragility of individual bones, the 'recognisability' factor of certain bones or parts of bones once reduced to fragments, and to storage conditions, which have no doubt caused further fragmentation. (Full details of the assessment of minimum numbers can be seen at Appendix 22.)

Simon Mays (1998, p.22) studied the effects of recovery factors and bone survival in a group of 226 thirteenth to sixteenth century adult burials from the site at Blackfriars, Ipswich, England. He calculated the presence of skeletal elements as a percentage of the numbers that should have been present if all of the burials were represented by complete skeletons. The percentages varied from under 20% of foot sesamoids and hyoids to just less than 90% of femora and tibiae. He generally found that the smaller bones such as those of the hand or foot were much more poorly represented than larger bones and concluded that the reason for this was likely to be that they were missed during recovery. He also found that skeletal elements with high proportions of trabecular bone, such as vertebrae or ribs, were under-represented when compared with bones with dense cortices, such as limb bones. These findings, he concluded, were most likely to be due to differential bone survival.

Mays went on to consider the assessment of minimum numbers of individuals from communal graves, based on counts of the skull, longbones, vertebrae and hand and foot bones. In a complete skeleton the following counts would be expected: 1 skull, 24 vertebrae, 12 longbones and 106 hand and foot bones (1:24:12:106). He compared this ratio to the results from Wharram Percy, an archaeological assemblage, although not a communal grave, where it was known that fleshed corpses had been deposited, and established the following ratio 1:20:10:41. A very similar ratio was found from the Wayland's Smithy long barrow. In comparison, a marked deficiency in hand and foot bones from Fussell's Lodge long barrow led to the conclusion that the skeletal remains were defleshed elsewhere and placed in the grave in a disarticulated state, a procedure where the small bones of the hands and feet could easily have been lost. A deficiency in the proportion of skull and limb bones at the West Kennet long barrow led to the conclusion that these bones had been removed from the tomb at some stage after the decomposition process had commenced (Mays, 1998). Surprisingly, the question of fragmentation is not discussed in this discussion of minimum numbers.

The results from Tomb N are very different to Mays' findings. Minimum numbers obtained from limb bones were much lower than say, for example, that based on vertebrae, surprising considering that vertebral bone is much less dense than that of limb bones and generally has a much poorer survival rate. (Although, in the case of Tomb N minimum numbers have been based on a count of a specific part of the spine [the axis and atlas] and whole spines or individual vertebrae have not been quantified). Furthermore, the smaller bones of the hands and feet produced a relatively high count. Although recovery methods and differential bone survival would no doubt have been a factor, the Tomb N results suggest that these were not the main reasons for the great differences in minimum numbers. The main reason is very likely to be the very different nature of the human remains. Mays' study was based partly on individual inhumations, while the Hili material consists of very fragmentary commingled remains. While limb bones did survive in great quantities, they were generally represented by very fragmented shafts, of little use in calculating minimum numbers. In addition there was a vast amount of unidentified bone not taken into account. In general, as it has become evident from working with the Hili material that smaller bones were more likely to survive intact than larger bones, it appears that the larger the bone, the greater the chance that it would be fragmented.

As discussed above the highest count of minimum numbers from Tomb was obtained from the petrous part of the temporal bone. This anatomical element consists of a small cone-shaped area of dense bone that survives comparatively well in archaeological conditions. While other parts of the crania and the rest of the skeleton may be reduced to largely undiagnostic fragments, petrous parts are easily recognisable, and easy to side. It is not possible to discount the fact that more skulls, and therefore petrous parts were deposited than other body parts[9]. However, in view of the above, it is quite likely that the number of petrous parts is more likely to be a truer reflection of the number of individuals deposited in Tomb N than other skeletal elements. Indeed, when other factors are taken into account, especially that from estimations of age (447 individuals - see the following section on ageing), the assessment of minimum numbers based on the number of petrous parts may be an under-estimation. It appears that the more fragmented the remains, the greater the discrepancy between the minimum numbers obtained from petrous parts and that obtained from the rest of the skeleton.

Human remains from the material retrieved from the original excavations contained at least 407 individuals. As previously mentioned, excavations of the section of the deposits left *in situ* are still continuing. It is likely that once the current re-excavation is complete, the number of individuals buried in the tomb will have risen to more than 600.

Age at death

Age has been assessed for 411 individuals; a further 36 individuals were of unknown age. (The results of the analysis of age indicate that there were 447 individuals buried in Tomb N, which differs from that based on bone counts – see above). The following

[9] The original excavators had concluded that Tomb N was a place of secondary burial, used to house the cleared remains from the immediately adjacent and upright Tomb E. The identification of many articulating and paired bones from the original excavations and the presence of at least partially articulated skeletons identified during current excavations, suggest that the use of Tomb N was more complex.

Table summarises the findings on age at death for the Tomb N population as a whole; Appendix 23 gives fuller details of the analyses of children, and Appendix 24 of adults.

Foetus/ Neonate	**Infan t**	**Child**	**Adolescent**	**Young adult**	**Middle aged**	**Old Adult**	**Adult**	**Total**
36	66	52	21	14	8	9	205	411

Figure 25: Tomb N – Age at death, all

One hundred and seventy-five individuals died before reaching adulthood, 43% of the total, and 58% of children died before the age of 5 years. This represents a high rate of infant mortality. Death during later childhood was also common, with 52 children (30% of all children) dying between the ages of 5 and 11 years, and 21 (12%) during adolescence.[10]

The results of the analysis of adult age at death are very disappointing. In the vast majority of cases (205, or 87%, out of a total of 236 adults) all that could be said was that the individual had reached adulthood. Although the ageing of adults is usually more difficult and less precise that that of children, the Hili remains proved to be even more problematic. This is due to the nature of the remains. The high level of *ante mortem* tooth loss, coupled by the fact that most teeth that had been present at death had either fallen out of their sockets or had become subsequently damaged meant that the degree of attrition could not be used. Although very advanced wear has been noted on a few teeth, suggestive of old age, when viewed in isolation without the rest of the skeleton, it is difficult to assess whether the degree of attrition is due to age or some other factor.

[10] A very high percentage of the material from the current excavations is also immature and the true rate of child mortality will become clearer once this has been examined.

Sex

Sex has been assessed, albeit tentatively, for 144 of the 236 adults identified in the assessment of age at death. The following table summarises the data on sex; full details are given in Appendix 25.

Female	**?Female**	**Sexually undiagnostic**	**?Male**	**Male**	**Sexed Adults**
49 (34%)	15 (10%)	23 (16%)	18 (13%)	39 (27%)	144 (100%)

Figure 26: Tomb N – Assessment of sex

The greatest number of individuals in any of the five categories (Females, ?Females, Sexually indeterminate, ?Males and Males) were female, followed by males. If the Female and ?Females were added together, these would account for 44% of the total; Males and ?Males add up to 40%. Sixteen per cent of the total were sexually undiagnostic, i.e., their dimensions fell between the ranges for males and females.

As previously stated, much of the evidence for sex was based on the vertical diameter of the femoral head. Measurements were compared with those of Pearson (as cited in Bass, 1995) who based his standards on 17th century London populations. The degree of accuracy of this method is not clear, especially when applied to the Tomb N population, although Pearson's ranges of measurements have been found to be too small for use with modern populations. Although several studies on sex estimation using the femur have been conducted, those based on the femoral head alone, the only feasible method for material such as that from Tomb N, are limited. However, regardless of the method used, none have been based on populations comparable to Tomb N, and a degree of inaccuracy must be expected. In the light of this, it is difficult to comment on Tomb N results, other than to state that a degree of sexual dimorphism does appear to be present, and that there is no clear evidence of a bias towards either males or females in the tomb.

Morphology

Because of the fragmentary nature of the material and the absence of fully articulated skeletons, it is difficult to get a clear picture of the morphology of the Hili population. No cranial measurements could be taken. There was only one fairly complete skull, which was found encased in soil, but even prior to cleaning, *post mortem* distortion meant that cranial measurements could not be taken[11].

Stature

Average height for the total population, on the basis of the length of the first metatarsal, was 164.36 cm (64.71 inches). Height range for both sexes was 147.80 cm (58.19 inches) to 183.42 cm (72.21 inches). In an attempt to estimate average height for males and females, only the lowest third of measurements were considered for females and the upper third for males. The results were an average female height of 155.28 cm (61.12 inches) and an average male height of 173.43cm (68.29 inches). This, however, excludes one third of the population and, no doubt, tall females and small males. Dividing the range of measurements into two provides an average of 157.65 cm (62.07 inches), with a range of 147.80 cm (58.19 inches) to 163.48 cm (63.36 inches) for females, and an average of 171.07 cm (67.35 inches), with a range of 164.62 cm (64.81 inches) to 183.42 cm (72.21 inches) for males.[12] Again, this probably excludes some tall females and small males, but is likely to be more accurate than taking the average of lower and upper thirds. In considering these results, it should be borne in mind that, not only are the results only tentative because of unknown sex, but the results of the study conducted by Byers *et al.*, indicated a standard error for the males and females of all of the races considered, of 65.4 mm. This compares with a standard error of around 3 to 5 cm for calculations based on

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[11] Some complete skulls have been retrieved from the on-going excavations of Tomb N. The results of the metrical analysis are currently being collated.

[12] The average of all averages for each bone was 165.63 cm, a difference of only 0.73 cm from the average for the right metatarsal. Of the other 153 complete metatarsals from which stature was calculated, all fell within the range of stature estimations for the right metatarsal, with the exception of one. This was an individual from Section 4 Level 5 whose height was estimated on the basis of a right 4th metatarsal at 189.96 cm (74.79 cm). The next tallest individual is already referred to in the text was 184.42 cm (72.21 inches).

long bone length, depending on the bone used[13]. Appendix 26 provides details of the data on stature.

The current excavations are producing more intact longbones, or at least enabling pieces of long bones to be reconstructed, permitting more accurate calculations of stature to be produced. Although the analysis of the human remains has not yet been completed, some results are available. To date, at least sixteen partially articulated individuals have been identified, as well as numerous disarticulated remains. Unfortunately, it has been possible to calculate stature for only one of the 16 individuals. Individual No.9 is a female, who was 155 cm, or 5 feet 1 inch, tall. Although, the number of intact bones has increased, many are still too fragmentary to be used in the calculation of stature. Several intact isolated longbones have been retrieved, but so far, only five are from those bones on which the sex of the individual could also be assessed – the humerus and femur. The results show that three females were approximately 154, 155 and 164 cm tall, respectively, and two males were 171 and 176 cm in height. These heights are clearly within the ranges obtained from metatarsals, although based on so few intact bones, no conclusions can be drawn which may supplement the information already obtained.

Disease

Pathological lesions have been noted in the general recording sheets for each archaeological unit and also collated in separate spreadsheets (Appendices), and grouped roughly according to the type of disease, i.e., trauma, joint disease, metabolic disease, dental disease, dental hypoplasia, and a miscellaneous category that includes lesions of unknown aetiology and conditions such as congenital anomalies. The use of these categories of disease is not intended to convey a firm diagnosis of the lesions; they are simply a means by which similar types of lesions, of *possibly* the same aetiology, can be analysed.

[13] The three complete radii from Section 2 Level 3/4 have not been included in the assessment of stature. A right and left bone produced heights of 174.17 and 174.93 respectively. These bones may have been from the same individual, who was probably male. A further left radius, probably belonging to a female, led to an estimated stature of 154.46. All of these estimations carry a standard deviation of 4.66 cm and are within the ranges for the population calculated by the metatarsal method.

Over one thousand bones or fragments of bones with pathological lesions were noted. These have been tentatively grouped as follows:

Type of Lesion	No. fragments
Joint	637
Infectious	4
Congenital	15
Trauma	65
Miscellaneous	65
Dental	139
Metabolic	254
Dental hypoplasia	31
Total	**1210**

Figure 27: Tomb N – Pathological lesions by type

Joint disease

Lesions were noted on 637 bones or fragments of bones. Although, at first glance, the degree of frequency may seem high, when viewed in relation to the total number of identified fragments (over 105,000), the frequency is actually very low (approximately 0.6%). Joint disease is essentially a condition of old age and, although the age of the individuals could not be ascertained in many cases, there were no identified cases of joint disease in children, and no clear cases of young adults being affected. Taking into account the estimated number of adults (236), there was an average of 2.7 fragments of bone with lesions per adult. However, the average number of identified fragments per individual was 235 (105000 fragments/447 individuals), and therefore the number of individuals with joint disease was probably quite low.

The incidences of joint disease, grouped according to the skeletal area affected, has been summarised at Appendix 29. The following table summarises lesions by skeletal area.

Skeletal Area Affected	**Frequency of lesions**
mandible	21
spine	433
shoulder	19
elbows	15
hands	21
hips	6
knees	47
ankles	23
feet	50

Figure 28: Tomb N- Joint lesions by skeletal area

The above record of lesion frequency does not differentiate between right and left bones, and makes no attempt to estimate the number of individuals affected. It is very likely that the individuals affected had more than one lesion. This impression was gained especially while examining vertebral remains, when it seemed clear that individual bones with similar pathology probably belonged to the same person. The frequency of lesions at the various joints has probably been affected by the variation in fragmentation of the remains. Hand and foot bones, patellae and vertebrae were fairly well preserved, which would account for the relatively high frequency of lesions at these joints, while pelvic remains and femurs were very fragmentary, and the low level of hip lesions may be at least partly due to this factor. The high frequency of spinal lesions is probably due to a) the number of individual bones in the spine and b) the degree of fragmentation of individual vertebra, as each small fragment, i.e., parts of bodies or detached facets were included. Even if the frequency only related to complete vertebrae, as few as only 18 individuals could have been affected (433/24 – the number of vertebrae in the spine).

Infectious Disease

Four possible cases of osteomyelitis were noted. One involved the distal end of a left humerus with a sinus; the other was in the proximal end of a right ulna where a pus sinus was associated with pitting and reactive growth and the third involved the diaphysis of a radius with general thickening of the shaft and reactive growth around the nutrient foramen and along the interosseous crest. The final case affected a proximal phalanx of the hand, which had 2 sinuses, marked porosity and proliferative growth over the whole bone.

Congenital Disease

There were 14 cases of fusion of the middle and distal phalanges of the toes. No other associated pathological lesions were present and a congenital origin is likely. There was one case of similar fusion of the middle and distal phalanges of the hand. However, these bones were ankylosed out of alignment and slightly overlapping and the fusion was probably not therefore congenital in origin.

Trauma

The number of traumatic lesions (65) in relation to the total number of fragments of bone and the number of individuals in the tomb is very low. The degree of fragmentation has probably affected the true level of frequency, which was probably much higher, especially on the larger bones, fewer of which had survived intact. It is probably for this lesion that most of the identified lesions have been on the smaller bones of the body. Full details of the incidences of trauma are given in Appendix 30. The following table gives a brief summary by skeletal area and type of trauma.

Area Affected	Fractures	Other Lesions
skull	1	0
clavicles	5	3
scapulae	0	1
ribs	16	0
vertebrae	5	0
upper limbs	2	0
hand bones	8	1
lower limbs	3	1
foot bones	14	5
Total	54	11

Figure 29: Tomb N – Traumatic lesions by skeletal area

Most of the traumatic lesions were healed fractures, identified by callus formation and/or angulation or displacement of the affected bone. There were 16 instances of rib fractures. Two of these belonged to a young child (Section 2 Level 4). Although the age of this child could not be accurately assessed, on the basis of size, the bones appeared to be from an infant. (It is tempting to envisage either a violent assault in this case, or someone dropping the baby!) Another rib (Section 4 Level 4) with a healed fracture was associated with gross enlargement of the bone and evidence of infection on the external surface. Another fracture at the proximal end of an ulna (Section 4 Level 4) involved marked distortion of the articular part of the bone. Fracture of a 1st metacarpal (Section 4 Level 6) appeared to have been associated with subsequent infection of the bone with secondary arthritis of the proximal articulation. Other healed fractures were unremarkable. The remainder of traumatic lesions included one possible case of dislocation of an acromio-clavicular joint (Section 3 Level 5), three cases of ligamentous injuries involving the costoclavicular ligament, a possible ensethopathic lesion on a fragment of diaphysis of a left tibia (Section 4 Level 4) and 5 cases of osteophytic growth on the calcaneus (Section 2 Level ¾ and Section 2 Level 5).

Miscellaneous Pathology and Diseases of Unknown Origin

Pathological lesions of miscellaneous uncertain aetiology are described at Appendix 33. Those of most significance are as follows. Four fragments of pubis had possible parturition scars. However, doubt has been raised about the status of pubic pitting. The association between so-called parturition scars, in a sample of adults of known parity status from Spitalfields, London was considered by Cox and Scott (1992) who found no significance statistical relationship between pubic pitting and parity. There were seven instances of pathology associated with the ears. A sinus was visible on the medial side of one petrous part of the temporal, partly destroying the wall of the external auditory meatus. The internal auditory meatus was much smaller than normal. Another fragment of temporal with the mastoid process had pitting and reactive bony growth around the external auditory meatus. There were two petrous parts with hyperostosis of bone close to the internal auditory meatus, a further two with very small internal auditory meatus and another two with exostosis around the external auditory meatus. A possible case of DISH (diffuse idiopathic skeletal hyperostosis) was represented by three articulating lumbar vertebrae, with gross osteophytes protruding from the body edges (the longest was 46 mm, although affected by post mortem damage) which had the appearance of a 'dripping candle'.

Dental Disease

There was a high frequency of dental disease. The 139 fragments of mandibles and maxillae and loose teeth with evidence of disease shown in the above table do not include the extremely high rate of *ante mortem* tooth loss, unless the fragments also had evidence of accompanying pathology, such as caries, dental abscesses or periodontal disease. Most adults had lost at least some of their teeth by the time of death. A total of 610 jaw fragments were examined, 503 belonging to individuals who had reached dental maturity (although, in a few cases the third molar had not quite fully developed). Sixty-four per cent of the adult jaw fragments had teeth missing *ante mortem*. The completeness of jaws varied from small fragments, consisting of one or two tooth places, to complete mandibles. The 610 jaw fragments do not directly equate with the number of individuals affected, although, as there were at least 447 individuals present (on the basis of the assessment of age at death), and many of the jaw fragments were incomplete, the number is not too dissimilar, indicating that a high proportion of individuals were affected.

A total of 2398 tooth places were counted, an average of just over four per fragment. Of these 939 (39%) had been lost during life. These results are based largely on macroscopic analysis. With the exception of a very few mandibles, which did not reveal anything of significance, jaw fragments were not radiographed, and it is possible that some of the teeth thought to have been lost during life, may have been congenitally absent or impacted, particularly third molars, as neither of these conditions is detectable without the aid of radiograph. On the other hand, it is possible that the percentages given are an underestimate, because teeth lost immediately before death, before the sockets had time to remodel, would appear to have been lost *post mortem*. The following charts demonstrate both the jaw fragments and teeth affected by *ante mortem* tooth loss. Only adults have been taken into account; those fragments where the dentition was still developing at the time of death have been excluded.

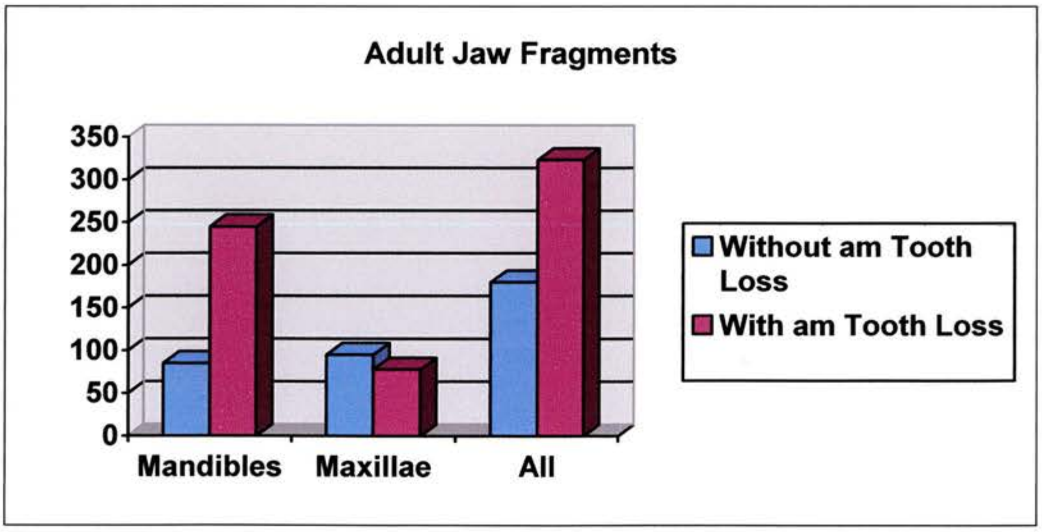

Figure 30: Tomb N – Jaw fragments with and without tooth loss

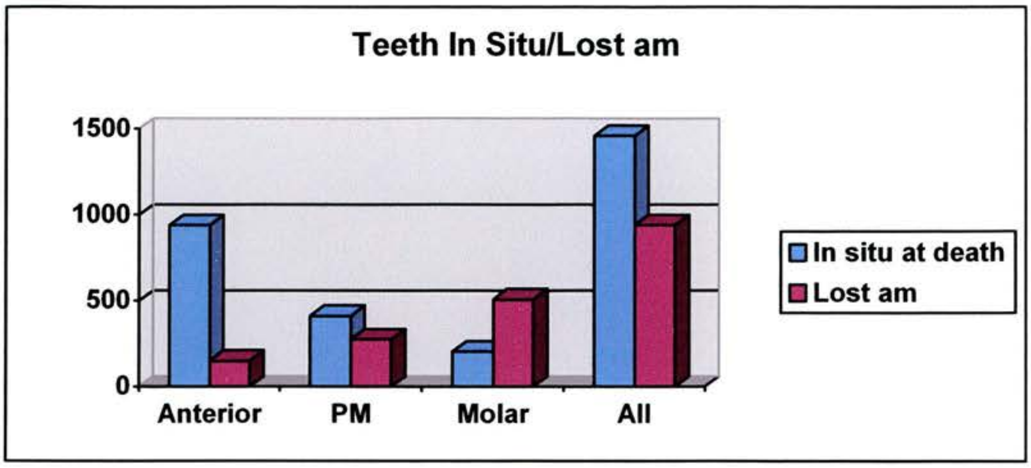

Figure 31: Tomb N – Teeth *in situ* and lost *ante mortem*

Not all categories of teeth had been affected to the same degree. Teeth were divided into 3 types – anterior teeth, consisting of incisors and canines, premolars, and molars. Fifteen per cent of anterior teeth had been lost during life, 40% per cent of premolars and 71% of molars. Therefore molar loss was greater than that of anterior teeth. A typical mandible is one where all of the molars had been lost with only the front teeth remaining (Figure 32). (The presence of anterior teeth at the time of death in the Hili population is in most cases denoted by the remaining sockets, the teeth having been lost some time after death. Because of their single roots, anterior teeth, *in situ* at death, are more likely to be missing than posterior teeth, which are anchored more firmly in the jaw. Among the Tomb N remains, those posterior teeth which had not been lost *in vivo*, commonly survived in the jaw but in a damaged state.)

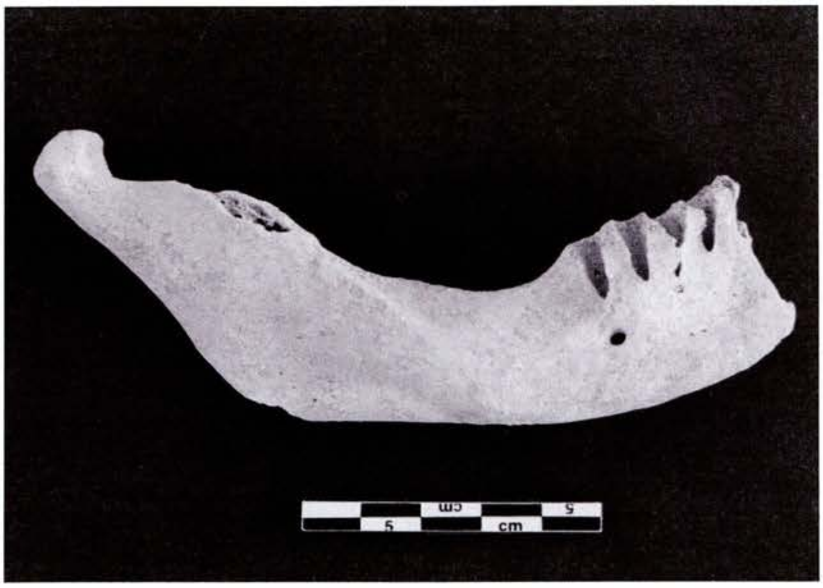

Figure 32: Tomb N - Typical mandible with posterior teeth missing *ante mortem* and anterior teeth lost *post mortem* (Section 3 Level 4)

The following two diagrams (Figures 33 and 34) indicate the apparent disparity between upper and lower teeth.

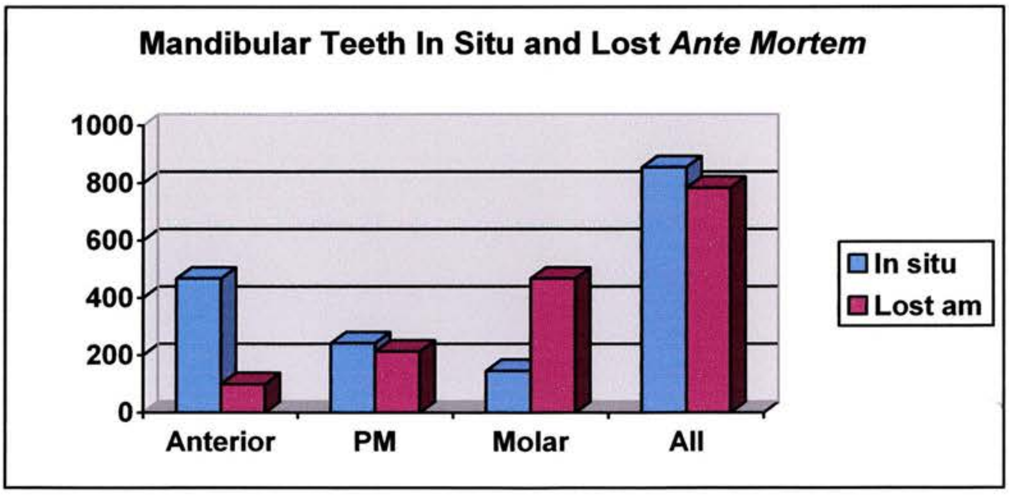

Figure 33: Tomb N – Mandibular teeth *in situ* and lost *ante mortem*

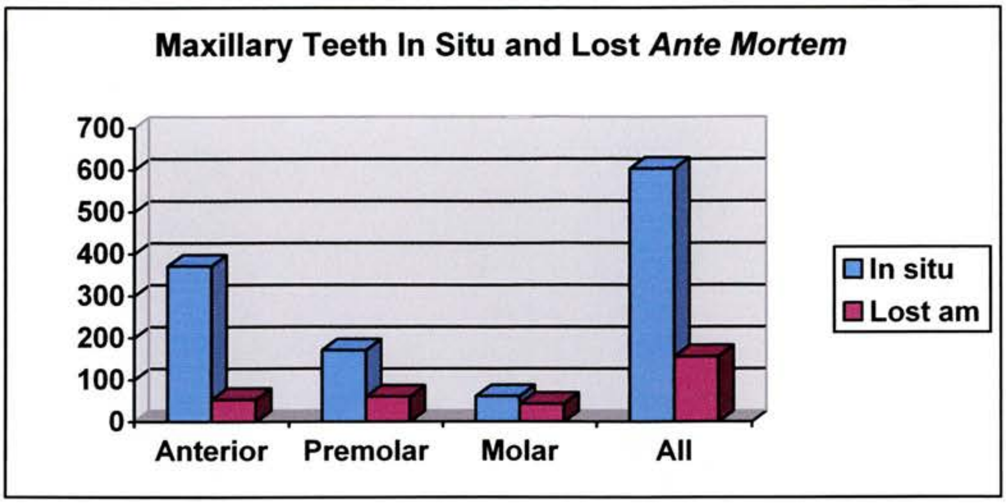

Figure 34: Tomb N – Maxillary teeth *in situ* and lost *ante mortem*

It appears that lower teeth were more likely to be lost during life than upper teeth. To a limited extent this may be true. However, the maxilla is more fragile than the mandible, and therefore less likely to survive intact in archaeological conditions, especially in Tomb N, where the fragmentation rate was even greater than normal. It is also possible that edentulous fragments of maxilla, especially the posterior parts, have not been recognised. These factors have no doubt had a bearing on the results. The imbalance between the number of mandibular and maxillary fragments is clearly shown in the results of the dental analysis. While a total of 330 mandible fragments were available for examination, only 173 maxillary fragments with dentition were identified. Generally speaking, only the anterior part of the upper jaws had survived. Upper molar places were clearly underrepresented when compared with lower molars. One hundred and four upper molar places were counted, and 613 lower molar places. Had the survival of maxillae been greater it is more than likely that a much higher rate of upper molar loss would have been revealed. There should be no particular reason why lower molar loss should be greater than upper molar loss, and it is more than likely that a further, perhaps, more thorough, check of the unidentified remains would discover more edentulous maxillary fragments. In view of the huge volume of unidentified fragments, such a re-examination has not been possible.

The following diagram indicates the percentage of tooth loss of all types of teeth divided into upper and lower.

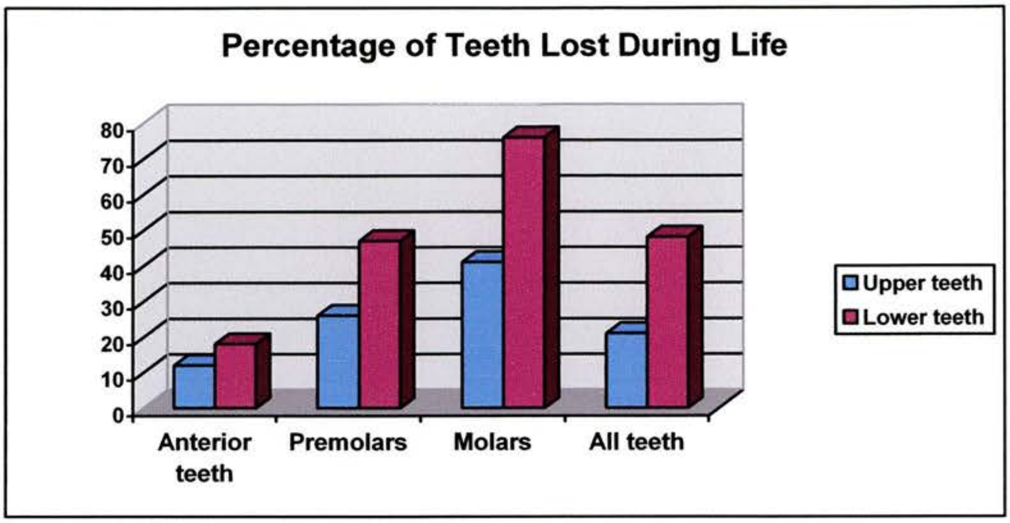

Figure 35: Tomb N – Percentage of teeth lost during life.

The cause of the high level of tooth loss in the Tomb N individuals is not entirely clear from the surviving evidence. In many archaeological situations the reason for the tooth loss in an individual might be deduced from examination of the remaining teeth and jaws, which, for example, may contain other carious teeth. However, with the Tomb N remains, not only are those teeth lost during life not available for examination, but, with some rare exceptions, those teeth that had been present at death have been lost *post mortem*. Although numerous loose teeth were identified, these were far fewer in number than empty sockets, and regardless of this factor, the volume of the remains meant that they could not be matched to empty sockets

Similar patterns of tooth loss have been reported from many prehistoric Gulf populations. It has been assumed by many that such loss is a consequence of the development of caries as a result of eating dates (for example, Bondioli, Coppa and Macchiarelli, 1998 on Tomb A, Hili North; Hojgaard, 1984 on Janussain, Bahrain).

There is no unequivocal direct evidence to show that caries was the main cause of tooth loss at Hili. One method of assessing the contribution of caries to the tooth loss is to examine the frequency of caries in the surviving teeth. If there was a high frequency of caries, it would be reasonable to assume that tooth decay was a major contributory factor. Unfortunately, as stated above, those teeth that had not been lost during life have not survived very well. The vast majority had fallen out of their sockets, and of those that had survived, many did so in a damaged state. Of the 1286 adult tooth places that had not been affected by *ante mortem* tooth loss, only 140 teeth (11%) remained *in situ* by the time of examination, and of these only 5 had survived undamaged. The extent of the damage on these teeth ranged from missing parts of the enamel to complete missing crowns with only the roots surviving. All of this damage had occurred *post mortem*.

Despite the damage, it should still have been possible to detect some carious lesions, especially those at an advanced stage. In only two cases were caries detected among the adult dentition. The first was on one of the few teeth surviving intact. There was a small carious lesion on the distal surface of the lower right second molar of a young adult from Section 4 Level 6. The left mandible from the third molar to the canine was present. The first molar was missing *ante mortem* and the third molar, the second premolar and the canine were all missing *post mortem*; the first premolar was present but slightly damaged. There was only slight attrition on the affected tooth. The other was in an adult from Section 1 Level 3 who had a possible caries on the upper first premolar. The crown of this tooth was severely damaged, but from the remaining portion, it appeared that there had been a large advanced lesion. The fragment of remaining upper jaw contained five tooth places from the left central incisor to the left second premolar. Both the central incisor and the second premolar had been lost *post mortem*, and the three other teeth were present but damaged. There appears to have been advanced wear on the canine.

Immature jaws were represented by 93 fragments, 75 of the mandible and 18 from the maxilla. There were 260 tooth places for fully erupted teeth. Of these 245 had been lost *post mortem*, 2 were missing *ante mortem*, eight teeth had survived *in situ* undamaged, and five were present but damaged. There were also numerous surviving unerupted teeth and empty crypts, but only the erupted teeth have been taken into account here.

Caries were noted on each of three immature jaw fragments. The first was in a small fragment of posterior mandible from Section 1 Level 3. The first deciduous molar had been lost *post mortem*. Crypts for the unerupted permanent premolars were visible. The second deciduous molar was present and undamaged. Age at death is thought to be around 4 years. There was a large carious lesion on the occlusal surface of the second deciduous molar. In a fragment of left maxilla from Section 2 Level 3-4, the deciduous canine was missing *post mortem*, and the second deciduous molar was present and undamaged. The status of the first deciduous molar is unclear. Crypts for three unerupted permanent teeth were present – the lateral incisor, the first premolar and the second molar. The first permanent molar had erupted and was present but damaged. The state of dental development indicated that age at death was around 7 years. There was a large occlusal caries on the deciduous second molar. The third case concerned a fragment of the posterior part of right mandible from Section 2 Level 5, from a child aged about 7-8 years. Remodelling of the socket of the second deciduous molar with some pitting on the alveolar surface indicated that this tooth had already been lost by the time of death. The deciduous canine was missing *post mortem* and crypts for the unerupted permanent second molar, the first premolar and the canine were visible. The first permanent molar had erupted and was present and intact. There was a carious lesion on the occlusal surface of this tooth, which had progressed to the dentine and underlay some of the occlusal enamel.

As previously stated, there were numerous loose teeth, both in the form of partly developed unerupted teeth and those which were fully developed and erupted, but had fallen out of their sockets some time after death. Often these teeth were in a fragmentary state and only teeth that were sufficiently intact to enable identification to be made have been included in the analysis.

It is clear that the number of loose teeth does not equate to the number of empty sockets. There were 1046 empty sockets in the adult mandibles and maxillae and 187 for deciduous teeth, a total of 1233. Of the 280 loose teeth, 118 were unerupted, and 162 erupted, of which 13 were deciduous and 149 permanent. (If any wear, however minimal, was visible on the tooth it has been regarded as erupted, even though in some cases the roots had not fully developed and the tooth may not have been in full occlusion.) So, there were only 162 loose teeth for the 1231 places, 13% of the total. Although the many tiny tooth fragments, too small to be clearly identified, would account for some of the missing teeth, it is possible that others were missed during the excavation process, or had fallen out of their sockets either before or after secondary deposition (if this did in fact occur). Although most of the empty sockets in question appeared healthy, it is possible that some teeth had been lost shortly before death, and the sockets had not had time to remodel.

Details of the lesions and the affected teeth are shown in the table below (Figure 36). Deciduous teeth are indicated by lower case letters and permanent teeth by upper case. The size of the lesion is based on the system used by Lukacs (1989, 267): "1) pit or small fissure caries; 2) medium to large - but with less than one half of the tooth crown destroyed; 3) large – more than one half of the tooth destroyed; 4) complete destruction of the tooth crown with only the roots remaining". Cases where there was clearly a carious lesion present but the tooth was so damaged that the degree or site of origin could not be established are indicated by "?".

Section/ Level	Affected Tooth	Age at death	Position of lesion	Size
S1 L3	Upper R m1	2-8	Occlusal	1
S2 L3/4	Lower R m1	4-6	Occlusal	3
S4 L5	Lower R m1	c. 3	Distal CEJ	2
S4 L5	Lower R m1	c. 3	Distal CEJ	1
S2 L3/4	Premolar	Adult	CEJ	3
S2 L3/4	Upper R M1	?	Distal CEJ	?
S3/4 L5	Upper L M1	Young adult	Occlusal	3
S4 L3	Upper R M3	Adult	Contact	1
S4 L3	Lower L M1	Child/adolescent	Buccal CEJ	2
S4 L3	Lower l PM2	Young adult?	Occlusal (fissure?)	2
S4 L3	Lower L M1	Child/adolescent	Occlusal	3
S4 L5	Lower M2	Adolescent	Occlusal (fissure)	4
S4 L5	Lower M2	Young adult?	Occlusal (fissure)	2
S4 L5	Lower L canine	?	Mesial CEJ	2
S4 L6	Lower R M2	Young adult	Distal	?
S1 L3	Upper L PM1	Adult	?	3
S1 L3	Lower ? m2	c. 4	occlusal	3
S2 L	Upper L m2	c. 7	occlusal	3
S2 L5	Lower R m1	c. 7-8	occlusal	3

Figure 36: Tomb N – Carious lesions

With the exception of two premolars and one canine, all of the affected teeth were molars.

Combining the data from jaws and loose teeth, there were 7 carious lesions from 26 surviving deciduous teeth, a rate of 26.9% of all teeth. Of the 289 adult teeth, 12 (4.1%) were carious. The caries rate for all 315 deciduous and permanent teeth was 6.0%.

Although, based on very few teeth, in view of the total number of individuals in the tomb, the overall caries rate appears to be quite moderate. In a survey of caries frequency from 10 sites in the Arabian Gulf from different periods ranging from the Mesolithic to the Islamic, Littlejohn and Frolich (1993) found caries rates by tooth to range from 0% to 25%. Of Bronze Age sites, Umm an-Nar had a caries rate of 2.4%, based on 327 teeth, in Bahrain the frequency was 13.3% out of 308 teeth and Shimal, in the Northern Emirates, had a rate of 4.6%, although was based on only 43, apparently loose, teeth. The highest frequency of 25% was from Site 5, Ras al Khaimah, in the Northern Emirates, dating to 100 BC – 100 AD, based on only 28 teeth. In Iron Age Oman Nelson *et al* (1999), who claimed that high levels of caries and *ante mortem* tooth loss were due to the consumption of dates, a caries rate per tooth of 18.4% of 141 teeth was observed, although a corrected rate of 32.4% of 182 teeth was calculated to take account of missing teeth. The rate of 6.0% for all teeth from Tomb N, although higher than the 2.4% observed in Umm an-Nar, is quite moderate when compared with other sites in the area. The caries rate for deciduous teeth from Tomb N at 26.9%, on the other hand, does seem quite high, although none of the caries rates given in the above mentioned publications differentiate between deciduous and permanent teeth, and a direct comparison is not possible. In general, the rates given in the two publications mentioned above are based on much smaller populations than Tomb N and tooth survival in relation to the number of individuals present is much greater than at Tomb N. Therefore the relevance of the caries rate at Tomb N, based on such relatively few teeth, is less than conclusive.

The identification of the cause of tooth loss among the Tomb N inhabitants is of crucial importance in the understanding of the contribution of diet to health. The above results do not confirm caries as the main cause of tooth loss. Although some individuals clearly suffered from caries, the relative contribution that tooth decay played in the widespread tooth loss of the Tomb N population cannot be established.

Teeth can be lost through a number of causes other than caries, for example, advanced attrition, periodontal disease, or nutritional diseases such as scurvy. There was also much evidence of dental abscesses and periodontal disease at Tomb N. A full record of the identified dental lesions are summarised in Appendix 28 but to assist in the analysis of dental disease lesions have been grouped in the following table according to location, i.e., the tooth socket, alveolus, or the tooth. A further category of miscellaneous lesions or those of unknown aetiology are identified as "?".

Location of Lesion	Frequency
Socket	91
Alveolus	36
Tooth	19
?	4

Figure 37: Tomb N – Dental lesions by type

The above table summarises the number of fragments with lesions in each category. Some fragments had more than one lesion of the same category, for example, several diseased tooth sockets; in such cases these have only been counted once. Lesions of more than one type occurring in one fragment of mandible or maxilla have been counted as one incidence in each category. *Ante mortem* tooth loss has not been included here.

Lesions of the tooth socket are the most frequent with 91 fragments affected. Both major abscesses, some with pus sinuses, as well as small pockets within the bone at the base of the socket are included in this category. No doubt, the high number of teeth lost *post mortem* have assisted in the identification of these lesions, especially those smaller ones at the base of the root, which would not have been visible without the aid of radiographic analysis, had the teeth been *in situ*.

Pathological changes of the alveolus occurred in 36 jaw fragments. This may have been localised to the bone surrounding one or a few teeth, or more widespread. Only those lesions where there was evidence of bone reaction and resorption of the alveolus have been included in this category. Instances of resorption of the alveolar bone without accompanying bony change have not been included.

The incidence of carious lesions has already been discussed above.

Lesions of unknown or miscellaneous aetiology include an almost complete mandible (Section 2 Level 5) with a depression in the internal surface to the right of the mental spine, a retained (?) lower deciduous tooth situated below and between the canine and the first premolar in an individual who was at least 17 years of age (Section 2 Level 5), an upper first premolar which had erupted posterior to the canine, well into the palate, and one fragment of maxilla with advanced dental attrition, which was angled towards the palatal surface and had exposed the root canal.

The recording of dental calculus was inconclusive. Not only was the body of teeth available for examination vastly diminished because of the high level of tooth loss during life, but, of the few teeth which had survived, very few had deposits of calculus. This could either be because the population did not have high levels of calculus or because deposits became dislodged before or after excavation.

The significance of the main categories of lesions and their relevance to tooth loss are discussed in Chapter 5.

Metabolic Disease

Bony changes of the cranium and orbits are thought to be indicative of various diseases loosely grouped under the generic term metabolic disease. These diseases include the classic nutritional deficiency diseases – scurvy, rickets and iron deficiency anaemia. Several cranial, orbital, and a few other fragments with marked lesions, possibly indicating the presence of metabolic disease, were noted on the Tomb N material. A total of 253 affected fragments were noted. These lesions are fully described in Appendix 31. The following table summarises the identified examples according to the skeletal area affected.

Skeletal Area	No. Fragments
Skull	3
Orbits	77
Parietal	28
Cranium	119
Temporal	20
Occipital	3
Malar	1
Mandible	1
Ribs	9

Figure 38: Tomb N – Lesions of possible metabolic origin by skeletal area

Recording of number of affected fragments in the above table is only intended to give a very rough indication of the frequency of lesions. It is very likely that there were several fragments from each affected individual. On the other hand, three complete but fragmentary crania each with several affected fragments have only been counted as one each. Two of the affected skulls also had orbital lesions.

Many of the affected fragments have thickened diploës, and labyrinth-like bone formation on the external surface. In some cases the only change is in the form of fine pitting on the external surface. The internal surfaces are unchanged. Most of the affected fragments are parietal. In all cases the exact location of some very small fragments was not clear and some could have been pieces of frontal. Orbital changes of various forms were noted in 77 fragments. The various forms consisted of fine pitting, large pits, areas of reactive growth and bone thickening.

All three of the only fairly complete, although fragmentary, skulls available for examination from the whole tomb, all from Section 3 Level 4, had changes similar to those described above, and these provided an opportunity to view the extent of these changes in these individuals, and an insight into how the other individuals, represented by only isolated small fragments, might have been affected. One skull had several fragments displaying thickening of the diploë and labyrinth-like formation on the outer surface. Of the cranial bones, only the parietals were affected. The areas of marked change were confined to the parietal bosses and could be seen to gradually reduce to a fine pitting on the external surface and finally to completely normal bone towards the sutural edges and the squamous portions which were unaffected. Bone thickness also gradually reduced with the changes on the external surface. Normal cranial wall thickness as seen near the coronal suture was about 3 mm, while at the centre of the lesion bone thickness was 10.68 mm. Two examples of the lesions, including a complete parietal, can be seen in Figures 39 and 40. Only one orbit was present; this also had an area of thickening with similar labyrinth-like growth on the orbit surface. Unfortunately, there were no dental remains with this cranium, but on the basis of general cranial thickness, unfused sutures and the unfused state of the basi-sphenoid, this cranium was from a child.

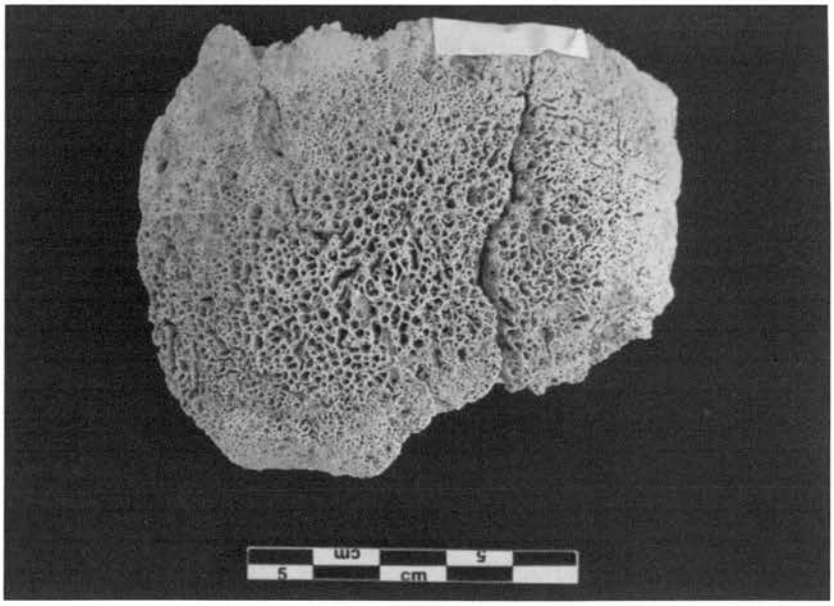

Figure 39: Tomb N – Fragment of parietal, Section 3 Level 4

Figure 40: Tomb N – complete parietal, Section 3 Level 4

One of the other crania, also very fragmentary, had an area of fine pitting, approximately 20 x 20 mm, on the external surface of the upper anterior part of the right parietal. The bone was otherwise unaffected. It is not clear whether the left parietal was also affected but no pathology was noted on any of the other fragments. The orbits were not present. General cranial wall thickness, unfused sutures and an unfused basi-sphenoid indicate that this cranium also belonged to a child.

The third cranium was the most fragmentary. It had been found, still encased in its surrounding soil, with the atlas. No changes were noted on the cranium itself, although reactive growth was present in both orbits. Fortunately, part of the upper dentition, although in a poor state, was present in this case. On the basis of the almost full development of the roots of a third molar, age has been assessed at 18-25 years.

Therefore, one of these individuals had lesions of the classic porotic hyperostosis type as described in the literature (for example, by Ortner & Putschar, 1981), accompanied by similar changes in the orbits, another had only orbital changes, while the third had an area of fine pitting on at least one parietal. It is not clear whether these variations have different aetiologies. In the first case, the same lesion could be seen to change from the classic thickened porotic type to only fine external pitting with a gradual loss of thickening. It also seems evident from the first two examples that orbital lesions can occur either on their own or with cranial changes. Several fragments where the only change was fine pitting on the external surface have been noted, and are included in the table above. It is not clear whether such changes of increased porosity are manifestations of the same diseases that can result in advanced porotic hyperostosis in some individuals, although perhaps at a less advanced stage.

Two of the fragmentary crania belonged to children and the other to a young adult. While it is not possible to accurately assess age in the other affected individuals only on the basis of isolated cranial fragments, in many cases the texture and thickness of the bone indicated that they were from immature individuals, and some were clearly from infants. Most fragments with marked porotic hyperostosis do appear to belong to children.

In addition to the above fragments with clear surface changes were numerous cranial fragments of excessive thickness – often in the region of 10-12 mm. Although a few fragments of this type have been included in the data on pathology, most, because it was thought that, apart from excessive thickness, they were otherwise normal, have not. However, close scrutiny of a sample of 26 fragments from S4 Levels 4, 5 and 6 has revealed several differences. Most of the fragments were parietal; some were probably part of the frontal bone. Thirteen fragments with thickness ranging from about 11 to 20 mm had enlarged spongy diploë containing some large trabeculae, but were otherwise normal. In a further seven fragments with thickness ranging from 10.4 mm to 12.5 mm, the diploë appeared normal, while the outer tables appeared thickened. A further five fragments ranging from 10 to 12 mm in thickness, had apparently normal diploë and outer tables of normal depth, but with fine pitting on the external surface. There was another fragment, 10 mm thick, with an expanded diploë, a fine outer table and some large pits on the external surface.

The significance of the increased thickness and variations, such as pitting, thickening of the outer table and expanded diploë, in these fragments is not clear. The thickness does appear abnormal: average cranial wall thickness in other fragments appear to be in the region of about 6 mm. Could these represent a healed stage of porotic hyperostosis? Brothwell and Blake (1966) found abnormal parietal and frontal thickness in the region of 11 mm in crania from the British Neolithic long barrow of Fussell's Lodge and concluded that the most likely cause was either slight anaemia or rickets.

In addition to cranial and orbital lesions were the frontal process of a left malar with fine pitting on the external surface, part of a left mandible from a child of about 6 months also with fine pitting on the external surface, the zygomatic process of the temporal with fine pitting on the external surface and 9 fragments of rib from a foetus or neonate and infants with periosteal reaction on the external surfaces. Although when viewed in isolation, the aetiology of such changes are not clear, they have been included with lesions of metabolic origin because they may be of relevance in the diagnosis of specific diseases. The possible cause (or causes) of these lesions is discussed in Chapter 5.

Similar to dental hypoplasia, although visible only on radiograph, Harris' lines are lines of arrested growth, thought to indicate periods of malnutrition or illness during childhood, when the body stops growing to allow for recovery (Harris, 1931). Arrangements were made for radiographs to be taken of a small sample of almost complete tibiae at a local hospital in Al Ain. No Harris' lines were visible on the resultant radiographs. Whether this was because the individuals concerned had not suffered any periods of stress, whether it was due to the poor state of the remains (all of the bones were from adults and none were fully intact), whether they had been present during childhood and subsequent remodelling had occurred making them invisible (Vyhnanek and Stloukal, 1988; Lewis, 2000), or, whether this was due to technical reasons, for example, the wrong exposure being used, is not clear. Vyhnanek and Stloukal (1988), in a study of a group of 160 adult males from Czechoslovakia, most of whom had lived around the time of the First World War and would have been exposed to dietary deficiency, found Harris' lines in only 35 (21.9%) of individuals. They concluded that the absence of Harris' lines could not be taken to represent good health status in a population.

Despite the poor survival of teeth, either loose or *in situ*, a relatively high frequency of dental enamel hypoplasia was noted. This disruption in the development of tooth enamel occurs during childhood while the tooth is developing in the jaw, and the effects remain visible on the tooth, usually in the form of bands or ridges on the crown. Enamel hypoplasia is thought to relate to periods of disease or malnutrition during childhood. It is clear from the Hili N teeth that many individuals suffered from several such periods during childhood. Hypoplastic lesions were noted on 31 teeth. This incidence represents about 10% of the teeth available for examination. With the exception of two matching teeth (Section 3 Level 4), is not clear whether all of these teeth were from different individuals, or whether there was more than one from the same individual. More than half (17) was from immature individuals.

CHAPTER 5. DISCUSSION

5.1. Condition of the Skeletal Remains and Methods

Condition of the remains

The nature of the human remains and recovery methods used can substantially affect the results of any osteological analysis. These factors became quite apparent in the light of the details of the two population profiles. The Schela Cladovei remains consisted of, in most cases, well-preserved, substantially complete, articulated remains; the Tomb N skeletal material, on the other hand, was highly fragmented and commingled. The state of the Schela Cladovei remains allowed more accurate information on age, sex, stature and disease to be extracted, than those of Tomb N.

Recovery methods

Recovery methods used at Schela Cladovei changed with the commencement of the joint project in 1992. The main difference was in the labelling, recording and subsequent treatment of the recovered bones. In the earlier excavations all of the bones from each burial had been collectively labelled, in most cases identified simply by an M number, in some cases only by location, and occasionally both. The skeletal remains were then collectively wrapped in brown paper parcels and tied with string. In subsequent seasons of the joint project, although each burial was given a collective M number, individual bones were given a unique identifying number, their exact position in the grave recorded on the label, and each separately wrapped in foil and bagged in plastic self-seal bags. Although the examination of the remains from the subsequent excavations was slower because each bone had to be unwrapped, the bones were protected from subsequent damage and possible missing or misnumbered bones could easily be checked. Problems were encountered in locating the remains from the earlier excavations. No inventory had been compiled, bones had been housed in various locations in Romania, and in one particular location skeletal remains had to be retrieved from a huge pile of disintegrating paper packages, containing numerous artefacts and bones from various archaeological sites, stacked against a wall; in many cases the packages had burst and the contents had fallen out. It is very likely that a great deal of information has been lost as a result. In addition, the many missing skeleton numbers indicate that some skeletons have not been located. At least 23 skeletons are unaccounted for. If these skeletons did exist and had been examined, population size would have been substantially increased.

There is no doubt that the excavation of Tomb N would have presented problems for any archaeologist. The contents of the tomb consisted of a mass of hundreds of thousands of commingled, mostly fragmentary, remains and artefacts, with no clear evidence of stratigraphy, and although current excavations, conducted by specialist field anthropologists, are revealing evidence of numerous articulated bones, related bones would have been extremely difficult to identify in such conditions by non-specialists. Furthermore, it would have been unrealistic for the whole tomb to be excavated using the current slow and laborious excavation techniques. After four seasons of work on the section left *in situ* following the original excavations, a depth of only approximately 40 cm of deposits have been recovered; at least another metre remains.

However, while better recovery methods could not have been expected under the circumstances, the subsequent treatment of the recovered human remains left a lot to be desired. While artefacts were apparently carefully treated and full inventories made, bones were not. Fragments were roughly separated into 'big bones' and 'small bones' and inadequately stored in cotton bags or cardboard boxes. As a result, further disintegration has no doubt occurred. The material was then located at different storage sites and as no inventory was made, there was no way of checking whether all of the material had been located. Indeed, as bone from some areas of the tomb has not been found, it is more than likely that it had not.

Poor recovery and curation have therefore probably resulted in the loss of valuable information from both sites. Although, especially in the case of Tomb N, the comprehensiveness of the osteological analysis was already limited by the burial practices employed and the nature of the remains, the employment of more rigorous recovery and packaging methods, such as those proposed by McKinley & Roberts

(1993), involving the marking of each bone and subsequent packing in plastic bags and cardboard boxes, clearly labelled by context, would have maximised our knowledge of the populations. In reality, however, the marking of each bone would have been an impossible task in the case of the Tomb N remains, and suitable packaging materials were very difficult to procure in Romania in the period of the initial series of excavations[14].

Osteological Analysis and Recording

Just as excavation and curation methods can affect the accuracy of the osteological analysis, so too can the methodology used in the process of conducting such analysis, particularly in the recording of the information extracted. The method of analysis and subsequent recording, is very much dependent on the nature of the human remains. The Schela Cladovei material presented no particular problems. The analysis of the individual skeletons was straightforward and the resulting data was recorded on pre-prepared proformas designed to facilitate the speedy recording of data, both descriptive details and metrical analysis. Recording of the Hili material, however, presented several problems. The volume of the material was overwhelming, and, unfortunately, my methods for approaching such a huge body of material were not clearly thought out from the outset, and were only gradually developed. Initially, it was decided to extract only key information. For example, only those bones that could provide information on minimum numbers, age, sex and disease, were utilised. It soon became apparent that in order to put this information into a meaningful context, a fuller analysis was essential, and so, some backtracking had to be done. The method of recording also caused some problems. Initially, information was recorded manually in note form and then input electronically spreadsheets. This process however, was extremely time-consuming and eventually it was decided to input data electronically at the time of examination. The analysis of the full assemblage of human remains took about one year, conducted over several seasons, but considerable time could have been saved if the methodology had been thought out more clearly in advance.

[14] The problem of the lack of suitable packaging materials for the Schela Cladovei material was alleviated from the start of the joint Romanian-British excavations and in the case of Tomb N from the start of the re-excavation of the section left in situ. In both cases, the previously poorly stored remains have now been re-packed and more suitably stored.

Although there is ample advice in the textbooks on the recording of data from single inhumations, there is very little on how to treat large bodies of unstratified and commingled remains, such as those from Tomb N. While numerous burials containing commingled skeletal remains are known, for example, from long barrow graves in the British Neolithic, none contained volumes of remains equivalent to that of Tomb N.

Large numbers of Neolithic long barrows have been discovered in the British Isles, 230 within the territory of the Windmill Hill culture alone, according to Megaw and Simpson (1979, 91). The following are but a few examples. The Neolithic long barrow at Fussell's Lodge, Wiltshire contained "bundled disarticulated bones, skulls and weathered pieces" (Ashbee, 1966, 37). The bones, which were thought to have been broken before deposition in the barrow and representing 53-57 individuals, were found in 6 discrete groups. This spatial distribution and the relatively small volume of material enabled some reconstruction into individuals to be carried out, sufficient to enable the conclusion to be made that there was no indication of the remains of individuals in more than one group, although it was not possible to directly associate any of the post-cranial remains with the skulls (Brothwell and Blake, 1966). Wayland's Smithy long barrow in Oxfordshire contained a "dense and confused mass of bones over 20 cm thick" (Whittle, 1991, 70). The bones were found in 4 main deposits, containing partially articulated skeletons. Some preliminary sorting into individuals was carried out in the field and subsequent to excavation by the excavator, and further sorting was conducted by the specialists. In West Kennet long barrow in Wiltshire, the largest in the Cotswold-Severn group, the remains of 46 individuals were found in several chambers (Megaw and Simpson (1979).

On average, the number of individuals interred in long barrows was 6, while the largest with over 50 was that at Fussell's Lodge (Megaw and Simpson (1979). Therefore the bone material from most British long barrow sites although similar to Tomb N insofar as it was mostly commingled and often fragmentary, contained much fewer individuals than the estimated 600 from Tomb N. The relatively small quantity of bones and the fact that in many cases discrete deposits were identifiable meant that a limited amount of sorting into individuals was feasible, an impossible task, both because of the volume of the burial deposit (7.65 m by 2.7 m and 1.7 m deep) and the absence of any obvious stratigraphy, with the Tomb N material.

The recording of the human remains with relatively smaller quantities of bones was therefore simpler. Specialists' reports on the human remains from both Fussell's Lodge and Wayland's Smithy (Brothwell and Blake, 1966, and Brothwell and Cullen, 1991, respectively) took the form of lists of bones belonging to individuals or groups of bones, and in a few instances individual bones, and tables summarising measurements and other demographic data (although it is very likely that proformas, such as the example published by Brothwell (1981), were used in the initial recording of data.

In the absence of a standard recording methodologies, especially one designed to deal with a large volume of commingled remains, systems enabling the recording of specific details of skeletal and the different forms of dental remains, i.e., jaw fragments and loose teeth in a format that allowed the data to be sorted, had to be devised. (The need for standardisation for recording dental data is discussed by Freeth [2000]). These methods are described in Chapter 3 and can be seen in Appendices 6 to 33.[15] These techniques have been quite successful and have been of great assistance in the assessment of minimum numbers, tooth loss, dental pathology, and age at death. One problem was noted, however, when the data was being summarised: in the case of the recording of unerupted or erupting teeth, it is not clear whether the tooth was actually *in situ,* or had been lost *post mortem* and the state of eruption determined from the presence of a crypt or a partly developed socket. It is not considered that this deficiency has had a serious detrimental effect on the results, but some refinement of the technique would be required for future use.

[15] Subsequent to these recording forms being developed Buikstra and Ubelaker published their standards for the recording of skeletal remains (1994) which includes a proforma for the recording of commingled remains (Chapter 2: Attachment 2). Although very similar insofar as it has columns for bone, side, completeness, MNI, age and sex, it does not allow for the recording of the number of fragments, ageing and sexing criteria, pathological lesions, measurements and general comments. This form is not, however, suitable for the recording of dental remains, either in situ in the jaw or in the form of loose teeth, and the authors offer no advice as to how these remains should be treated.

5.2. Age at Death

Methods for Assessing Age

Dramatic improvements in life span in western society over the last few hundred years, and especially in the last few decades, have lead to the widespread assumption that lifespan among prehistoric populations was much shorter than today. Cox (2000) suggests that our obsession with age was probably not a major relevance to past societies. Nevertheless, the age of death of an individual or mortality rates within a population, can be key indicators of general health. There are, however, major problems with the accuracy of methods for assessing age at death. Molleson & Cox (1993) found in an eighteenth century London skeletal population, including many of known age at death, that, using traditional ageing methods only 39% were correctly aged to very broad age categories, 2% were over-aged, while 58% were under-aged. Even using the 'complex method', i.e., ageing based on a combination of radiographically assessed age-related loss of trabecular bone in the humerus and femur, pubic symphysis morphology and the degree of cranial suture closure, devised by Ascadi and Nemeskeri, the authors found that the degree of accuracy was poor. Less than 30% were accurate to within 5 years, 50% were accurate within 10 years and 75% within 15 years[16]. The authors also commented that those individuals under 40 tended to be over-aged, while those over 70 were under-aged. Whittaker (2000, 84) concurs with this opinion, and considers that there is a tendency in particular to under-estimate age in individuals of over fifty.

Methods for Ageing of Foetuses and Neonates

Even with the ageing of children who can normally be more accurately aged than adults, problems of accuracy occur. The ageing of foetal or neonate remains from both Schela Cladovei and Tomb N was based on the length of individual bones which were then compared with those measurements outlined in Fazekas and Koza (1978) for three- to ten-lunar-month male and female foetuses. There are two main problems

[16] It is interesting to note that Molleson and Cox found that the degree of accuracy improved when cranial suture closure was not included in the assessment. General estimates of the degree of suture closure were recorded during the analysis of the two populations in this study, although, in view of the degree of individual variability which makes this method unreliable [see for example, Buikstra and Ubelaker, 1994, 32], it was not used in the assessment of age.

in using such a method. Firstly, there are no accepted methods for sexing immature remains, and so the sex of the skeletal remains in the prehistoric samples was unknown. The results of the study by Fazekas and Koza indicate that the dimensions of male and female foetuses of the same age differ quite considerably. For example, for ten-lunar-month skeletons the male humerus was 6.5 mm longer than that of the female (69.5 mm and 63 mm, respectively), the tibia was 4.3 mm longer (68.3 mm and 64 mm), the fibula 8.3 mm (67.3 mm and 59 mm) and the femur 2.2 mm (76.2 mm and 74 mm). The inability to sex the immature remains in the populations under consideration must therefore have led to a degree of inaccuracy. The second area of difficulty arises because the work of Fazekas and Koza was based on a sample of modern Hungarian foetuses and there is no was of knowing whether the rate of intrauterine development would have been the same for prehistoric populations. Furthermore, Fazekas and Koza based their study on 138 especially selected male and female foetuses from healthy parents who had no history of endocrine diseases, constitutional anomalies, or pathological conditions of the skeleton. Some of the foetuses were stillborn while the others lived for a short time after death (Fazekas and Koza, 1978, p29). It is quite possible that babies born to mothers suffering from nutritional insufficiencies or deficiencies, or other illnesses during pregnancy would be smaller than normal, and thus assignments of age based on the standards of Fazekas and Koza would be too young. Miles and Bulman (1994) compare the results of their examination of foetal long bones from the island of Ensay in Scotland with two others studies – that of Fazekas and Koza (1978), and another by Scheuer *et al.*, (1980), which was based on standardised radiographs. They found considerable variation between each of the studies, highlighting the likely inaccuracies in any age assessments. A further degree of inaccuracy, specific to the current study, but which may also apply to others, arises as a result of the condition of the remains. Many immature long bones, particularly those from Tomb N, were incomplete and maximum lengths have had to be estimated. (To ignore such remains because they were less than intact would have further diminished the already very limited findings imposed because of the degree of fragmentation and commingling of the remains.) As a result of the foregoing, the ageing of foetal and neonate remains can only be considered to be a very rough indication of age.

Methods for the Ageing of Children

Estimations of the age of older children in this study have been based, wherever possible, on both dental development and diaphysis length; in most cases only one or the other was available. It is fairly universally accepted that the ageing of the skeletal remains of children based on dental development is more accurate than that derived from long bone measurements (Miles & Bulman, 1994; Hillson, 1996; Scheur & Black, 2000; Whittaker, 2000; White & Folkens, 2000).

Ageing of both the Schela Cladovei and Tomb N immature individuals was based on two sources – skeletal development and dental development. Unfortunately, because of the nature of the Tomb N material, the two bodies of data have had to be viewed in isolation from each other. In no case were dental remains directly associated with other skeletal remains. Ageing based on skeletal development was assessed from the length of individual bones. Assessments of age at death from a single bone must be treated with caution. Various studies attempting to set growth standards for children have been conducted, but these are either based on recent radiological examinations of living children (for example, Maresh, 1955; Gindhart, 1973), or on other ancient populations that may not be directly comparable (Ubelaker, 1978; Jantz & Owsley, 1984; Y'Edynak, 1976). Similar to foetal remains, any resulting inaccuracies are compounded by the fact that in many cases in the present study maximum length was estimated because the bone itself was incomplete. There are also difficulties in assessing the minimum number of individuals involved. If, for example, the length of a left humerus and a right femur both suggest an age of death of six years, it is not always clear whether they originate from one or two individuals. There is also the added problem of the possibility of delayed growth. It could not be ascertained whether an individual was of small stature for their age. Dental ageing has been shown to be preferable to skeletal ageing because it diverges less from actual age than skeletal age when the body is under stress (Scheuer & Black, 2000; Humphrey, 2000, 29). The difficulties of assessing of the number of individuals involved and that presented by the degree of fragmentation are lessened with dental remains. With fragmentary dentitions, it is much more straightforward to establish the number of individuals involved. For these reasons ageing of the Hili children based on dental development is thought to be more accurate than that of skeletal development and has been used in preference to diaphysis length. (In the case of foetal or neonate remains, however, where dental evidence is lacking, diaphyseal length has been used.)

In assessing the age at death of a child, the state of dental development is compared with published standards (for example, Ubelaker, 1978; Gustafson and Kock [as reproduced by White and Folkens, 2000, 344]). The method used, chosen largely because of its ease of use, was that published by van Beek (1983, 131). Van Beek does not indicate his source, but his diagrammatic representation of dental development is virtually identical to that produced by Ubelaker (1978) (also reproduced by White & Folkens, 2000, 343, and Hillson, 1996, 144). The only difference between the two standards is in the margins of error indicated for each stage of development, generally less in van Beek. For example, the margin of error for the standard given for a 6-year old child in van Beek is ±9 months, whereas Ubelaker (according to White & Folkens) gives a margin of ±2 years. Both diagrams appear to be derived from Schour and Massler's original dental development diagram (Hillson, 1986, p 143, published in 1941, in which unqualified ages were assigned for each stage without ranges. It is quite possible that the differences in the ranges assigned by both van Beek and Ubelaker relate to the populations on which they were based. Those of van Beek appear to have been based on a collection of modern British teeth, while those of Ubelaker relate to Native Americans. Nevertheless, while the various standards used do take into account normal individual variation, they do not reflect population differences and the results must be taken to indicate *dental* age, which can only be broadly related to actual age at death.

As previously stated, the other method used for assessing the age at death of children was diaphyseal length. Maximum lengthwise measurements were compared to growth curves produced by Miles and Bulman (1994). These growth curves were based on the skeletal remains of 120 immature individuals, whose dental remains had also survived, dating from AD 1500 to AD 1850. The most widely used standards for comparing age based on diaphysis length are those published by Maresh (1955). Miles and Bulman discuss the lack of suitable standards for comparison, including the inaccuracies of the Maresh study, which was based on radiographs of living North American Caucasoid children. Miles and Bulman found their results compared more favourably with other early populations than those of Maresh and recommend the use of the Ensay growth curves in preference to those of Maresh for archaeological material.

In the absence of suitable comparative standards for Romanian or Gulf populations, the Miles and Bulman growth curves have been used in age assessments based on long bone length for the purposes of this study, with the caveat that the Ensay curves may not be directly applicable. Again, the condition of the Tomb N material has no doubt injected an even greater degree of inaccuracy. As with the foetal remains, the bones of many of the older children were incomplete, and long bone length often had to be estimated.

Methods for the Ageing of Adolescents

The age at death of adolescents was assessed on the basis of the state of epiphyseal fusion, and/or dental development. There are, however, considerable variations in the rate of closure of the epiphyses, depending on sex, individual variation, and possibly also in cases of delayed growth due to malnutrition or disease. The degree of variation between fusion of the epiphyses and the problems of accuracy if age is assigned on the basis of a single epiphysis was highlighted in one case from Schela Cladovei. This was the almost complete skeleton of a female (M40). The third molars were in the process of erupting, which would indicate an age, according to van Beek (1983), of 17-21. The following table indicates the state of fusion of various epiphyses and age ranges assigned for those epiphyses by (Buikstra & Ubelaker, 1994):

Epiphysis	State of Fusion	Age Range
sacrum	1st body unfused	under 32
scapula	fused	over 14½
medial clavicle	unfused	under 30
proximal humerus	fusing	14½-23
distal humerus	fused	over 15
proximal radius	fused	over 14½
distal radius	unfused	under 23
iliac crest	fusing	14½-23
proximal femur	just fused	15½- 19½
distal femur	unfused	under 21
proximal tibia	R fusing: L unfused	16-23
distal tibia	R fused: L fusing	14½-23
distal fibula	fusing	14½-23

Figure 41: Schela Cladovei - Epiphyseal fusion (M40)

The above information highlights several problems with age assessments based on the state of epiphyseal fusion:

1. The assessment of age can vary considerably depending on which bone is used. An age of less than 15, assigned on the basis of full fusion of the distal humerus, cannot be easily reconciled with an age of 16-23 for the period of fusion of the proximal tibia, and 15½ to 19½ for the proximal femur. Clearly, one would normally arrive at a consensus of age, based on the whole skeleton, but in the case of the Hili remains, where individual bones must be considered in isolation, considerable inaccuracies could arise.
2. It is clear that the state of fusion of some epiphyses is of little use in the assessment of age, for example, in the above case where fusion of the 1st sacral body to the 2nd, and the medial clavicle, only provide ages of less than 32 and 30, respectively.

3. Not only is there considerable inter-individual variation, but there can also be variation between the normal ages of fusion within an individual.
4. There is a clear discrepancy in this case between dental age and skeletal age. On the basis of the state of epiphyseal fusion, taking all of the epiphyses in the above table into account, age would probably be assessed at around 15 years, but within the range of 14-16. However, on the basis of the state of development of the third molars, which were all in the process of erupting, an age of 17-21 would be assigned (van Beek, 1983).

In addition to the problems highlighted above, there is considerable variation in claimed ages of fusion, in the various published sources. For example, to take the proximal humerus, according to Buikstra and Ubelaker (1994), as indicated above, fusion occurs between 14½ and 23, Bass (1995, 148) gives an age of 'about 20 years', Krogman and Iscan (1986) state a range of 19.5 to 20.5 ± 1.5 years (i.e., 18 to 22 years), and Breathnach (1965) indicates an average of 18 for females and 19-20 for males.

Regardless of the source used, it is quite clear from the foregoing, that any age assessment based on epiphyseal fusion must be treated as only approximate.

Methods for the Ageing of Adults

The ageing of adults is even more problematic than that of children and juveniles. Although younger adults, in the final stages of skeletal maturity can be fairly accurately aged, once the skeleton is fully developed, the assessment of age become much more difficult and the results less accurate (Cox, 2000).

The two main forms of skeletal degeneration assessed are the degree of wear on the teeth, particularly the molars, and the state of degeneration of the skeleton, especially that of the pelvis and spine. Even when skeletal remains are in good condition, the accuracy of age can be affected by the nature of the diet of the population (gritty food causes the teeth to wear faster than soft food), or heavy occupation, or trauma (both of which can cause the skeleton to degenerate at a faster rate than normal). Degrees of degeneration therefore can vary considerably between both individuals and populations.

There have been various studies attempting to assess adult age on the basis of morphological changes in the pubic symphysis. According to Todd (1920), distinctive morphological changes can be related to quite specific age ranges, and he devised model standards for 10 typical phases of the male *os pubis*. Similar standards were set for the female pubic symphysis (the Gilbert and McKern system, as reproduced in Bass, 1995), although, this system has only six phases and specific age ranges have not been assigned. The attraction of using these methods is obvious - they provide a unique opportunity to accurately assess adult age in the absence of other precise methods. However, in practice, the application of these standards is less than straightforward. In many cases, the area of the pubic symphysis is not present or the state of preservation is too poor to be useful. However, even when the bone is present and in good condition, it is often difficult to assign a specific stage to the bone being examined. In some cases it appeared that several stages could apply, and in others, none. The same difficulties were experienced by Cox in her work on the Spitalfields material (2000).

An assessment of the degree of dental attrition, which advances with age, can give an indication of the age of an individual. Brothwell (1981) devised a simple method, based on the relative degrees of attrition on the molars in British Neolithic to medieval populations. However, as the degree and pattern of tooth wear is closely related to the nature of the diet, Brothwell's method is not applicable to all populations. Ideally, attrition standards, based on a study of attrition in juveniles (Whittaker, 2000) should be assessed for each population being examined. In many cases, however, there are insufficient numbers of immature individuals with intact dentitions to allow this exercise to be carried out. This was certainly true of the Schela Cladovei population, where the number of immature individuals were few. In the case of the Tomb N remains, while there was a high number of children and adolescents within the population, dental remains were too poor and, in any case, isolated from other skeletal remains, to enable attrition rates to be assessed. In the absence of other methods, therefore, Brothwell's standards have been utilised, although only for the purposes of assigning a 'dental age'. In the case of the Tomb N remains, however, very few had survived to enable attrition-based age to be assigned.

In the light of all of the above considerations, therefore assessments of age at death for both of the populations under consideration must be regarded with a certain degree of caution.

Methods for Summarising Data on Age at Death

To enable meaningful analyses on age at death to be made, the data on the various assessments of age need to be grouped. The age classifications used in the study are set out in Chapter 1. There are no clear conventions on which classes should be adopted, and it is important to ensure that these are always included in any study of a human population, but regardless of which age groups are used, difficulties must arise when the age range for an individual straddles two groups. To take the example given above of the female who was aged somewhere between 14 and 21 years, given the conflicting evidence. This individual could fit into either the 'adolescent' or the 'young adult' categories. In such cases a judgement has to be made as to the most appropriate. (It was decided to put this individual into the adolescent category, because although a dental age of 17-21 had been assessed, skeletal maturation had not been reached.) Many such age assessments do not directly match the classification adopted, resulting in a further degree of inaccuracy in the analysis of age at death. In many cases all that can be said about the age of an individual is that adulthood had been reached, and a further 'adult' category is required. Although, it was possible to assign age to most adults in the Schela Cladovei population, despite good preservation there was still a high proportion that could not be aged (24, or 39% of the total adult population). The degree of fragmentation and the commingling of the Tomb N remains meant that very few of the adults could be more accurately aged – 205 of the 236 adults (87%) could not be assigned to either the young, middle or old adult categories.

It is surprising, therefore, in the light of the above observations, that one sees very precise age categories being used in many osteological reports. For example, El Najjar

(1985, 42), in his brief report on 188 individuals from the Tomb A at Hili North, neatly assigns a very precise age to each. He uses 11 very narrow age categories between the ages of 4 and 35, and apparently had no individuals over 35.

Although new methods are constantly being devised in an attempt to standardise osteological procedures, the lack of suitable methods, the inherent inaccuracies of some, and the incompatibility of others with the population to which they are being applied, means a large amount of subjection and imprecision is unavoidable. The following quotation from Maples as cited by Roberts and Manchester (1995, 23) is quite pertinent: "age determination is ultimately an art, not a precise science".

This opinion is equally applicable to evaluations of sex and stature. Non-metrical analyses are highly subjective, and while metrical analyses should inherently be more objective, a great deal of care and skill is required in the taking of measurements to reduce possible errors.

Comparison of the results

Although it is not the purpose of this study to directly compare the two populations, but given the discussions on whether the number of children are truly represented, there does appear to have been marked differences in age at death. The high proportion of foetal and neonate bones, infants and children of all ages in Tomb N indicates that infant and child mortality was higher for the Tomb N population, than for Schela Cladovei. Forty-three percent of the Tomb N inhabitants had died before reaching adulthood. From the Schela remains, 11 of the 74 articulated skeletons belonged to children – 6 foetuses or neonates, 2 infants, one child about 6 years, and 4 adolescents - 18% of the total population.

Schela Cladovei

The population statistics from these two very different burial locations cannot easily be compared. There is clearly a much smaller proportion of children among the Schela remains. However, in terms of numbers of individuals, the Schela population is by far the smaller, and it is not clear how representative the recovered remains are to the composition of Schela Cladovei population as a whole. The low number of immature remains may be a true reflection of low infant mortality, and indicative of a healthy, well nourished, disease free population. Conversely, it is possible that infant mortality was higher than suggested, and that immature remains are under-represented.

Excavations at Schela Cladovei have recommenced, and although further burials have not yet been discovered, the indications are that only part of the full burial area has previously been excavated. Radovanović (1996) claims that the first continuously used burial areas in the Iron Gates Region appeared during the Mesolithic. The number of burials recovered from the various Mesolithic sites, including Schela Cladovei, and the period of use, suggest that this was a continuously used burial area. If the population, as is likely, were mobile hunter-gatherers, the site at Schela Cladovei may well have been used only on a seasonal basis, and some of the dead of the community may well be buried elsewhere. The proportion of children to adults is low for what would be expected of a prehistoric population, where high levels of deaths in infancy and childhood are often found (Roberts & Manchester, 1995, 24-5; Wood *et al*, 1992, 346-7) and it is possible that the remains of children were treated differently, either buried in a particular location, or disposed of in some other way. Some of the Schela babies were found in an articulated position. In other cases, although the skeletons were fairly complete, the bones had been heaped in a pile, indicating reburial. In addition, there were several instances of isolated immature bones found with the articulated remains of other children and adults. If the Schela Cladovei group were indeed mobile hunter-gatherers, the method of burial may have varied depending on the location of the group at a time a member died.

In contrast to the nearby site of Lepenski Vir on the opposite bank of the Danube, where babies appear to have been consistently buried under the floors of houses, or at least close to houses, there does not appear to have been a designated area for babies or older children at Schela Cladovei. Here immature remains have been found dispersed over a wide area, rather than concentrated in a selected burial ground. It is unlikely that the entire burial area has not been located and that therefore the recovered Schela skeletons are not representative of the population as a whole.

The lack of published data makes a comparison of infant mortality at Schela Cladovei and other sites in the area problematic. There appears to be a large proportion of immature burials at least in the earliest phases of Lepenski Vir I, the Late Mesolithic phase. According to Radovanović (1996), from a sample of 22 individuals, thirteen were young children (*infans*). Only three were from older children (*infans* II), and there were 6 men (one *adultus* and five *maturus*). However, many of the burials were found in the proximity of dwellings, and a direct association between the burial of children and houses is claimed, i.e., children were deliberately deposited within the floors of the houses, it is possible that this area was a specially designated area for children and the proportion of children to adults is of no relevance.

Of 91 examined individuals from Vlasac, (Lengyel, 1978), 20 (22%) were children up to the age of 10 years and 71 were adult. Thirteen (14% of all individuals) were aged between 0 and 3 years, five (5%) were between the ages of 3 and 5, and 2 (2%) were in the 6-10 category. Therefore, there were twenty children in all, or 22% of the total. This age profile is slightly different to that of Schela Cladovei, where the number of children, excluding adolescents, was 10, or 14% of the total population. The majority of the Schlea Cladovei immature individuals were either foetuses or neonates. Unfortunately, the age classification of 0 to 3 years at Vlasac does not differentiate between perinatal deaths and those of the older children and so a direct comparison is not possible. However, broadly speaking, there are similarities between the two groups, insofar as most of the children were very young, and there were very few remains from older children.

A comparison with the Padina population is not possible because the age structure is unknown due to missing data (Radovanović (1996).

Tomb N, Hili Gardens

Tomb N, in contrast to the more widely dispersed burials at Schela Cladovei, was a purpose built grave, apparently used by all sectors of society, for, on the basis of the radiocarbon dates obtained so far, between 100 to 200 years, and is probably more representative of the Hili population as a whole than the Schela Cladovei remains.

The high degree of fragmentation could have rendered many of the more fragile remains of children unrecognisable, resulting in an under-representation of children. Nevertheless, fragmentation did seem to affect larger bones more than smaller ones, and as there was a significantly higher proportion of foetal and neonate remains and infants amongst the Hili N population, it is possible that the numbers of children have not been seriously compromised.

The causes of high infant mortality

High rates of infant mortality are an indication of poor nutrition and disease. At a time when the death rate for infants under 1 year in developed countries was 40 per 1000, and that of children between 1 and 4 years was 1 per 1000, the rates in less developed countries was said to be as high as 200 per 1000 and 20 per 1000, respectively (Food and Agriculture Organization of the United Nations, 1963). Protein-energy malnutrition, resulting from an inadequate intake of protein and calories, is the most common nutritional disorder in the world today (Neale, 1988, 83). Marasmus is a wasting disorder caused by an inadequate intake of food, resulting in severe malnutrition, and occurs especially during the first year of life. "The starving children of central Africa show the classical signs of marasmus (Neale, 1988, 84). Kwashiorkor is a condition, largely affecting children between 1 and 4 years, where the diet is adequate in the terms of calories consumed, but low in protein. In a study on the problems of food and nutrition in sub-Saharan Africa, the FAO (1959) found that infant mortality was 150-300, and as high as 500, per 1000. Mortality in the 1-4 year group was also said to be high, although details are not provided. It is not clear whether the FAO mortality rates are based on live births or living population. According to Davidson *et al*., (1979, 473), the most frequently used statistic for infant mortality is "the number of babies dying in the first year of life per 1000 live births", so presumably this is what has been used in the FAO report. Davidson *et al*. go on to reproduce statistics from The Netherlands during World War II based on the number of deaths per 1000 inhabitants, i.e., on the living population, the standard for general death rates. On the basis of 411 aged individuals from Tomb N, foetus/neonate and infant deaths can be calculated at 25% of the total. When children between 3 months and 4 years are included, the mortality rate for all children under 5 is 37%, and if older children and adolescents are included it rises to 43%. These figures appear high, although it is not possible to directly compare them to the rates quoted by the FAO because neither the live birth rate, nor the total size of the living population is known.

There have been dramatic improvements in mortality rates in developed countries in recent years. While improvements in diet associated with growing affluence have clearly played a part in enhancements in mortality rates in general, so too have advances in the field of medicine and better standards of living. It is difficult, therefore to isolate the dietary effects. However, Davidson *et al.,* (1979) state that although death certificates may record the cause of death as gastroenteritis or respiratory disease, poor nutrition will have contributed to many of the deaths, and in the case of infectious diseases, the chances of survival were lessened if nutrition was poor. It is widely accepted that poor nutrition leads to a compromised immune system and higher susceptibility to disease. The immune system may be impaired by malnutrition (Davidson *et al*., 1979, 506; Schroeder & Brown, 1994, 575). While good nutrition does not necessarily prevent infectious disease (Davidson *et al*., 1979, 506), higher death rates have been associated with malnutrition, suggesting that better nourished individuals have greater rates of recovery. A study by Schroeder & Brown (1994) showed that children with mild-to-moderate malnutrition had a mortality of 2.2 times greater than better nourished children in the period of 6 to 24 months after they had first been monitored, and in severely malnourished children the risk was 6.8 times greater.

Could the high rate of foetal and neonate remains from Tomb N be the result of under-nutrition in pregnant women? Studies undertaken after the siege of Leningrad in 1941-2 and in Holland at the end of World War Two have shown that starvation before and during the first trimester of pregnancy can increase the rates of miscarriages (Neale, 1988, 22). While, it appears that starvation during the later stages of pregnancy, results in lower birth weight, the reduction is largely due to a loss of body fat, rather than length, and if the child is subsequently well-fed, catch-up growth occurs (Neale, 1988). There is no doubt, however, that under-weight babies are less able to fight disease and so poor nutrition at any time during pregnancy could have an indirect effect on infant mortality rates.

Factors influencing marasmus are a succession of pregnancies, early and abrupt weaning followed by a diet low in energy and proteins (Passmore & Eastwood, 1986, p 280). Hillson postulates, on the basis of the timing of hypoplastic defects that weaning in the ancient Nile Valley may have occurred at three to four years (1979). An analysis of the hypoplastic lesions at Hili reveals no clear patterns. Hypoplasia occurred at all ages from 1 year to 12 years, and as many were related to older childhood than infancy. The greatest frequency occurred at the ages of 3, 4, 5, and 6, and so while perhaps in the case of those occurring at age 3 and 4 may have been related to weaning, the others could not. As several individuals displayed several lesions during childhood, the cause is perhaps more related to repeated periods of disease or malnutrition. Most of the immature remains from Schela Cladovei were foetal or neonate and the remains of only one older child was found, a six year old, so weaning was clearly not a factor in these deaths.

The Hili remains, while they contained a large number of foetuses and neonates, also included a large proportion of the remains from older children, and, of the individuals with hypoplastic lesions, 53% died before reaching adulthood, suggesting that there was a close relationship between the presence of hypoplasia and early death.

The lack of published data means that a comparison of the Tomb N remains with other contemporaneous sites in the Arabian Peninsula is limited. In one published study, that of the type-site of Umm an-Nar, the proportion of children among the total population of the examined graves was low (Kunter, 1991). From a total of 100 individuals, only 18% were immature. Kunter does not give a breakdown of ages within this 18%, and the full age range of the 18 or so children is not clear. However, it does appear that there were no foetal or neonate remains, that there were at least two children between the ages of 2 and 5, and five aged between 6 and 13. This low proportion of immature remains, an under-representation of females, and the frequency of arthritis of the hands, feet and shoulders on the skeletons of males, led Kunter to conclude that the site at Umm an-Nar was a work camp for men working on boats, craftsmen and metalworkers. There was also a high proportion of elderly individuals, and several were said to be aged 50 to 80 years, leading to an interpretation of high status individuals and optimal living conditions. Unfortunately, it is not known how this compares with Tomb N, because the age profile of the adults is largely unknown.

Details of the population at Tomb A, Hili North, only a few kilometres from Tomb N and thought to be at least partly contemporaneous, are difficult to ascertain. El Najjar (1985), apparently found no adults over the age of 35. Of 188 individuals, 173 or 92% were adults aged between 16 and 35. There were said to be almost equal numbers in the 20-25, 25-30 and 30-35 categories (54, 54 and 52, respectively). However, some doubt must be cast on El Najjar's findings. He reports only 15 children between 4 and 16 years among 188 individuals, and made specific reference to the absence of neonates and infants. Although their results have not been published in detail, following a re-excavation of Tomb A, Bondioli *et al.*, (1991), estimated a minimum number of 300 individuals and a high rate of infant mortality.

Some details on mortality rates from other sites in the Middle East have been published. A sub-adult mortality rate of 37.3% and an infant mortality rate of 10.7% have been calculated for third millennium BC Bahrain (Frolich, 1983). Similar rates of 39% and 9% were found at Bab edh-Dhra in Jordan (Ortner, 1979). The overall sub-adult mortality rate for Tomb N is moderately higher, with 43%, than at both these sites. However, the infant mortality rate is considerably higher. Including all foetus/neonates and infants, the rate is 25% of the aged individuals. Even if foetus/neonate individuals are excluded on the basis that not all of these were live births, the rate is still high at 16%. These differences may relate to the condition of the Tomb N remains; while the ageing of immature individuals was considered to be reasonably accurate because of the better preservation of immature remains, the higher degree of fragmentation of the larger, adult bones could have resulted in an underestimate of the minimum numbers present.

5.3 Stature

Although partly predetermined by genetic factors, stature can be an indicator of overall health and nutrition. It is a common assumption that adult height is at least partly determined by genetics. This is the position taken by Tanner who states that, "growth is the continuous and complex interaction of heredity and environment" (1989, p119). Tanner goes on to state however that while genetics do play a part, environment is much more important to final adult height.

Environment in the context of growth studies includes climate, disease, and socio-economic status as well as nutrition, but there is no doubt that malnutrition delays growth. Growth studies of children are an accepted measure for assessing the health and nutrition of a population (Eveleth & Tanner, 1990). Among living children, methods such as weight and skin fold measurements are used in conjunction with height measurements. The former two methods are clearly not appropriate for use with a skeletal population, but the latter is by far the most accepted method.

There is ample evidence to demonstrate that the quality of the diet has a direct effect on growth and stature. Tanner (1989) reproduces data that indicates the effects of malnutrition on growth in height on Stuttgart children of school age from 1911 to 1953. Drops in average height during the periods of the First and Second World Wars when food intake was restricted are clearly demonstrated. However, providing that periods of food restriction are not too severe or prolonged, 'catch up' can occur and there may be no long-term effects, allowing individuals to attain normal adult height.

Birth size seems to be important. Studies of twins have shown that the smaller of the two at birth will probably remain so. (Tanner1989).

"Small adult size, skeletal growth deficits, and prolonged skeletal growth can each be used as indicators of environmental stress" (Humphrey, 2000, 35). Poor nutrition can lead to slower growth during childhood. Many studies have been conducted in recent times on the assessment of growth rates of children from skeletal remains (e.g., Miles & Bulman, 1994, 1995). One of the main problems in trying to ascertain whether the children in a prehistoric population suffered from delayed growth is that it is difficult to establish whether long bone length, and skeletal and dental development reflect the true age of a child who had maintained a normal growth level and had died perhaps as a result of an acute illness or trauma, or whether the individual was a sickly older child who suffered from stunted growth and development because of prolonged or repeated insults to the skeleton. Another problem is that although children can suffer from stunted growth as a result of periods of malnutrition of illness, as soon as adequate nutrition is re-established or recovery from illness occurs, 'catch-up' can take place, so that normal growth and development is resumed. In poorly nourished children, skeletal maturation may be delayed, allowing a longer time for growth (Humphrey, 2000). Such children can develop into normal sized adults, and those that survived into adulthood would not feature (at least as a child who suffered from delayed growth) in a study of the dead in a population. However, if stress indicators such as hypoplasia and lines of arrested growth (Harris lines) are present on the bones of a child, it may be reasonable to assume that the individual did suffer from periods of stress during childhood and so true age may be greater than long bone length suggests.

Growth in Children

In order to make a comparison of growth studies of immature remains it is necessary to have fairly complete skeletons, where at least the long bones and dentition have survived. The development of the dentition, thought to vary less from true age in times of stress, than height, enables age at death to be established, so that skeletal growth can be compared with modern standards, as in the study carried out by Maresh, which was based on radiographs of living North American Caucasoid children (Miles & Bulman, 1994).

It has not been possible to conduct a similar exercise for either of the two populations examined. In the case of the Schela Cladovei population, with the exception of foetal or neonate remains, there were very few remains of older children, most were neonates. In addition to a few isolated bones, only one fairly complete skeleton of a child aged, on the basis of dental development, 6-7 (M96/3) was available for examination. Unfortunately, this skeleton was very fragmentary. An estimated length of 245 mm was calculated for the length of the left femur. This compared quite favourably with Maresh's femoral diaphyseal length for a child of 5-7 (as reproduced by Miles and Bulman) and was greater than that for Ensay children of the same age (Miles & Bulman, 1994), suggesting that the M96/3 individual did not suffer from stunted growth. However, this is based on just one child, and on a bone where diaphyseal length could only be estimated, and cannot be considered to be of great relevance. One would need a substantial population available for study before any meaningful conclusions could be drawn. It might be assumed that because the Schela Cladovei adults were fairly tall, that stunted growth was not a problem during childhood. However, the adults of the population were those who *survived* childhood; they may not have been affected by stress during childhood, or, if they had, any delayed growth might have been 'caught up'.

While there were numerous immature remains amongst the Tomb N remains, both of long bones and dentition, in no case was it possible to relate one with the other. While it is tempting to assume that, in view of the smaller adult height, and the evidence of poor health as seen in the high child mortality rate and skeletal indications of stress and disease, that stunted growth must have been a factor during childhood, there is no way of establishing this.

Adult Stature

The differing nature of the human remains necessitated that the methods for calculating stature differed between the two populations. Because the remains consisted of largely discrete inhumations with largely complete long bones, that of the Schela Cladovei population was based on long bone length, according to the methods outlined in Trotter and Gleser (1952, 1958). The combined lengths of the tibia and femur, which give the most accurate results, were used where these were available. If these were not present, or not complete enough to measure, one of the other long bones was used, with preference given to the results from lower limb bones.

Calculation of stature amongst the Hili population, owing to the lack of complete long bones, was problematic. Estimations of height were based on metatarsal and metacarpal heights, although these provide less accurate results than using long bones (± 7 cm, approximately, as opposed to about 3-4 cm for long bone lengths). These results were rendered even less accurate by the fact that the sex of the owner of the metacarpal or metatarsal could not be established from the single bone.

There is clearly a marked difference between the average heights of the two populations (see Figure 42 below). The Schela Cladovei population was tall. The average height for males (based on 29 individuals) was 179.78 cm (70¾ inches). The height range for males was 172.25 cm to 188.49 cm (67¾ inches to 74¼ inches). Average height for females (based on 18 individuals) was 165.31 cm (65 inches) and the range for females was 154.00 cm to 172.31 cm (60½ to 67¾ inches). The Hili population produced the following results: average of 157.83 cm (62.14 inches), with a range of 147.8 cm (58.19 inches) to 164.62 cm (63.94 inches) for females, and an average of 171.36 cm (67.46 inches), with a range of 164.74 cm (64.86 inches) to 183.42 cm (72.21 inches) for males. The following table summarises the calculations of stature for the Tomb N and Schela Cladovei groups.

	Tomb N	**Schela Cladovei**
Females: average	157.65	165.31
Females: range	147.80-163.48	154.00-172.31
Males: average	171.07	179.78
Males: range	164.62-183.42	172.25-188.49

Figure 42: Male and female stature – Schela Cladovei and Tomb N.

Despite the greater intrinsic inaccuracies in the method used for the Tomb N population compared with that of the Schela Cladovei population, and also taking into account the small sample size of which height could be estimated for both populations, there does appear to be significant differences between the two. The Schela Cladovei females were on average almost 8 cm taller than those of Tomb N, while average male height was almost 9 cm greater. There were also similar degrees of difference in the ranges for each sex. The variation is of equal magnitude for each sex. Combined male-female data show a very similar differential. Tomb N adults averaged 164.74 cm, while the mean for Schela Cladovei was 174.24 cm. The disparity between average statures for all adults was slightly more than that for the individual sexes at 9.5 cm.

While diet may well be an important factor in the marked differences of stature of these two populations, there are too many differing factors, such as the huge differences in time, climate, ecology, food sources and gene pool, to make any meaningful comparison. Although thought to be of less importance than environment, there is no doubt that genetics will have played some part in the marked differences in stature. All populations do not have the same growth potential and there are differences between populations that are not nutritionally related. Comparisons between European children in London, Chinese children in Hong Kong and Afro-Americans from Washington, showed that, despite the fact that the Asiatic children came from high socio-economic groups, they were smaller than the other two groups. Tanner concludes that the difference must be mainly due to genetics (Tanner, 1989). Studies made in the 1950's showed that Japanese children living in the United States were taller than Japanese children in Japan. Some 30 decades later as the standard of living improved in Japan, there was little difference between them, but today Japanese Americans are smaller than those of European or African descent (Tanner, 1989). It seems quite reasonable to conclude from these facts that the smaller height of the Japanese living in Japan during the 1950's was partly governed by genetics and partly due to environment, while the height of Japanese people today is largely governed by their genes. Although there is no evidence for different racial origins between the two prehistoric populations, the differences in height are likely to be at least partly related to genes. However, there is no means by which the genetic contribution can be ascertained.

The contribution of diet in the stature of the population under examination might be more easily established by comparing similar populations. However, it is difficult to compare the heights of the Schela Cladovei population with other groups in the Iron Gates area because, with the exception of Vlasac, little anthropological data has been published in detail. Nemeskéri's brief report on Lepenski Vir tends to concentrate on skull morphology. Only four of the 85 skeletons discovered belonged to Group A, the oldest and thought to be Mesolithic. Height calculated from long bones was 175.00

cm to 178.00 cm for two males, which Nemeskéri regarded as tall, and the only female was163 cm tall. (Stature of Neolithic and later periods from Lepenski Vir were said to be 'moderately tall', although no details are given.)

Height was estimated for six males and one female from 37 individuals in very poor condition from the late Mesolithic levels at Padina (Živanović, 1975), although precise details are unclear. It would appear that the males ranged from 163.24 cm to 185.15 cm, while three 'had a height ranging between 173 and 179 cm'. (The height of the sixth male is not indicated.) The female was said to be 152.56 cm.

Anthropological data from the human remains from Vlasac was given in greater detail (Nemeskéri & Szathmāry, 1978). Of the 117 individuals examined, stature was estimated for 19 males and 20 females. Two methods were used to calculate stature – that of Pearson (1899), and that of the more universally adopted method of Trotter and Gleser (1952, 1958). The results using the latter method are discussed here to enable comparison with the Schela Cladovei material. Although Nemeskéri and Szathmāry did not publish details of mean population stature, by combining the individual heights given, average height for females was 163.2 cm, with a range of 155.5 cm to 171.7 cm. Male heights averaged 176.6 cm and ranged from 165.5 cm to 188.4 cm.

There appears to be a marked difference between the stature of Eastern European Mesolithic populations and those of Western Europe. Meiklejohn *et al.,* (1984), summarise stature estimations for Western European populations. Male height averaged 167.7 cm (46 individuals) and females averaged 155.6 cm (36 individuals). Specific information on the sites used in the sample is not given, but the authors appear to be accepting that all of the individuals in their study were from certain Mesolithic contexts. Albrethsen and Petersen (1976) present average height for 7 males and 5 females from the Mesolithic cemetery at Vedbaek, Denmark as 170.8 cm and 151 cm, respectively. Bennike (1985) provided data on stature for the Mesolithic for the whole of Denmark and, based on 6 males and 7 females, found average stature to be 161.5 cm for males and 154.0 cm for females. It would appear from the resulting average heights and the size of the populations considered, that Bennike did not include the individuals from Vedbaek in her calculations.

The following Table summarises the above information on stature in the Mesolithic period in Europe. The heights for the two males and one female at Lepenski Vir have been included in order to display the information graphically, even though they are not statistically significant. Average height for the Padina males has been based upon data for the four individuals whose stature could be ascertained from the text. The single female from Padina has also been included even though at 152.56 cm she is unlikely to have been of average height. The data from Vedbaek, and for the whole of Denmark has also been included, although it is not clear whether this has already been included in the data for Western Europe, summarised by Meiklejohn *et al.,* (1984)

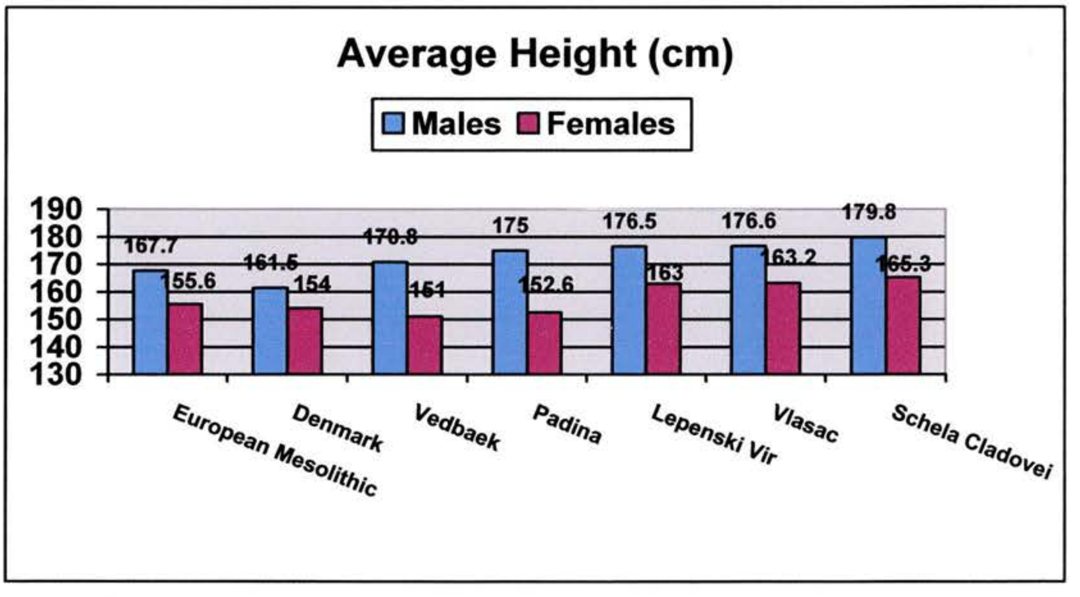

Figure 43: Average height European Mesolithic.

These results appear to show marked differences between Western and Eastern European populations. It is difficult to draw any meaningful conclusions from these dissimilarities, without more information on the sites, size of the populations and the individuals taken into account in the Western European averages. Although, as the males from Schela Cladovei were on average 12 cm taller than Western European males and the females almost 10 cm taller, and as stature has been calculated using the same method, such a marked difference must be significant. (Because of the unknown factors involved, i.e., the number of individuals on which average stature has been based and the sites included in the Western European mean heights, statistical tests have not been applied.)

Of the Iron Gates sites, excluding the probably unrepresentative single female from Padina who was only 152.56 cm, both males and females from Schela Cladovei were taller than those from the other three sites – the males by about 3-4 cm and the females by about 2 cm. As previously mentioned, the summary tables for the anthropological data for each of the individuals from Vlasac gave two estimations of height, one based on Pearson's method and the other on that of Trotter and Gleser. The data given for individuals from Vlasac has been summarised and it is interesting to note that average stature using the Pearson method was considerably lower – males by 6.2 cm and females by 5.4 cm (average male height 170.4 cm and average female height 157.8 cm). Trotter and Gleser (1952) who considered and compared Pearson's method with their own findings found that Pearson's method produced results that were too low for American military males. The data produced showed that errors of estimation ranged from 11 to 4 cm less, with an average of 3.67 cm for calculations based on the maximum length of the femur. Živanović (1975) also used the Pearson method for calculating the heights of the Padina individuals. On the basis of the discrepancies in the Vlasac results and taking into account the findings of Trotter and Gleser, it is reasonable to postulate that if he had used the Trotter and Gleser method, average height for males would probably have been greater, possibly in the order of 181 cm for males, taller than that for Schela Cladovei, and 158 cm for the single female. However, without the individual details on which stature was based it is not possible to demonstrate this hypothesis. It is not known what method was used to calculate stature for Lepenski Vir. Therefore, while the available evidence indicates that the Schela Cladovei population was of greater average stature than the Vlasac population, the Padina individuals, or at least the males, may in fact have been of similar average height. The number of individuals from Lepenski Vir are too small to make any meaningful comparison, although they do fall within the ranges for both sexes.

Average height for the Tomb N males was 171.07 cm, and females averaged 157.65 cm, with a range of 164.62 cm to 183.42 cm for males and 147.80 cm to 163.48 cm for females. Average heights from other sites in the area are not easy to ascertain because there is little information in the literature. A very brief report on the human remains from the site of Tomb A, Hili North was published by El-Najjar (1985). The author reported that least 188 individuals had been recovered from this classic circular Umm an-Nar tomb. A published photograph of the *in situ* skeletal remains demonstrates that at least some of the remains were primary inhumations of fully articulated individuals in apparently good condition. (A preliminary excavation report (Vogt, 1985) indicates that articulated skeletons were only found in one of the four internal chambers of the tomb - Chamber 3.) Very little specific data is included in El-Najjar's paper, which is a summary report and includes many unsubstantiated assumptions. He describes the population as robust and tall. Males were said to range from 171 cm to 182 cm with an average of 178 cm. Females averaged 172 cm and ranged in height from 166 cm to 175 cm. El-Najjar does not indicate which method was used to calculate stature, although as photographic evidence shows several individuals with intact long bones, it is very likely that long bone length was used. Nor does he indicate the number of individuals on whom the calculations of stature were based. The results for the two populations are not directly comparable because of the likely difference in methods used in calculating stature, but even taking into account the greater inaccuracies involved in calculating Tomb N stature, the difference in average height is quite remarkable. The Tomb A, Hili North males were on average 7 cm taller than those of Tomb N, and the females over 14 cm taller. Indeed, average height for the Tomb N males was almost exactly the same as the Tomb A females.

Some doubt must be placed upon the accuracy of at least some of El-Najjar's findings. Besides the information he provided on stature, he reports a very low number of children – only four between the ages of 4 and 10 years. He also states that there was a complete absence of any kind of malnutrition, and, with the exception of three cases of osteoarthritis, no other pathologies or abnormalities, leading him to conclude that the inhabitants of the oasis led a healthy life. He goes on to state that of the few upper and lower jaws recovered there was no evidence of severe attrition, periodontal disease or caries, and there were only four occurrences of ***post mortem*** tooth loss. The reference to *post mortem* loss is presumably a misprint, because a photographic reference given in the text by way of example is of a mandible with ***ante mortem*** loss.

A further brief report on the Tomb A material has been published by Bondioli *et al.,* (1998). This report differs from that of El-Najjar in several respects. An estimate of 300 individuals was made – El-Najjar reported "at least 188 individuals". High infant mortality was found, whereas El Najjar had commented on the remarkably low rate. Bondioli *et al.,* report:

"an impressive number of caries-related *ante mortem* teeth lost (a dates consumption effect), also involving the primary dentition",

while El-Najjar specifically mentions only four cases. They also found a few incidences of cribra orbitalia, spina bifida occulta, periosteal reactions and traumatic lesions, although do not document the frequencies of these conditions. In contrast, El-Najjar found no pathological lesions with the exception of three examples of osteoarthritis. It is possible that these dissimilarities have arisen because El-Najjar' did not examine all of the material, some of which was recovered in subsequent excavations. It is also possible that El-Najjar's brief findings may have been influenced by the examination of the examination of the group of primary articulated skeletons. However, in one major respect Bondioli *et al.,* do substantiate El-Najjar's conclusions of a population of high stature. Mean adult male and female height was said to be 1.770 mm and 1.700 mm, respectively, very similar to the findings of El-Najjar (178 cm and 172 cm).

Kunter (1991) examined some of the human remains from the type-site of Umm an-Nar, named after the island of the same name in Abu Dhabi Emirate. Of the fifty registered tombs, Danish archaeologists excavated seven. Human remains from four of these (with the exception of the dentition) were examined by Kunter. From an estimated number of 76 adults examined, stature was calculated, using Trotter and Gleser's method, for only eighteen males and three females. Average height for males was 167.1 cm and for females 153.6 cm.

Kunter goes on to compare the Umm an-Nar results with other prehistoric populations from the Oman Peninsula, including El-Najjar's report of the Tomb A inhabitants, the Neolithic site of R'as al Hamra in Oman where males averaged 166 cm and females 157 cm, the early second millennium tomb from Shimal, Ras al-Khaimah, UAE with mean male and female height was 168 cm and 158 cm, respectively, and Bronze age and Iron Age populations from Wadi Samad, Oman, where the earlier peoples had statures equating with those of Tomb A at Hili and the smaller, and later Iron Age inhabitants who were of similar size to the Tomb A population. Kunter postulates (without having the advantage of the Tomb N data) that these differences related to the different diets associated with coastal and inland dwelling. At Wadi Samad he speculates that the reduction in stature over time was related to the introduction of new communities in the Iron Age. The following chart gives a graphic illustration of stature, on the basis of the available information, of various prehistoric populations in Arabia.

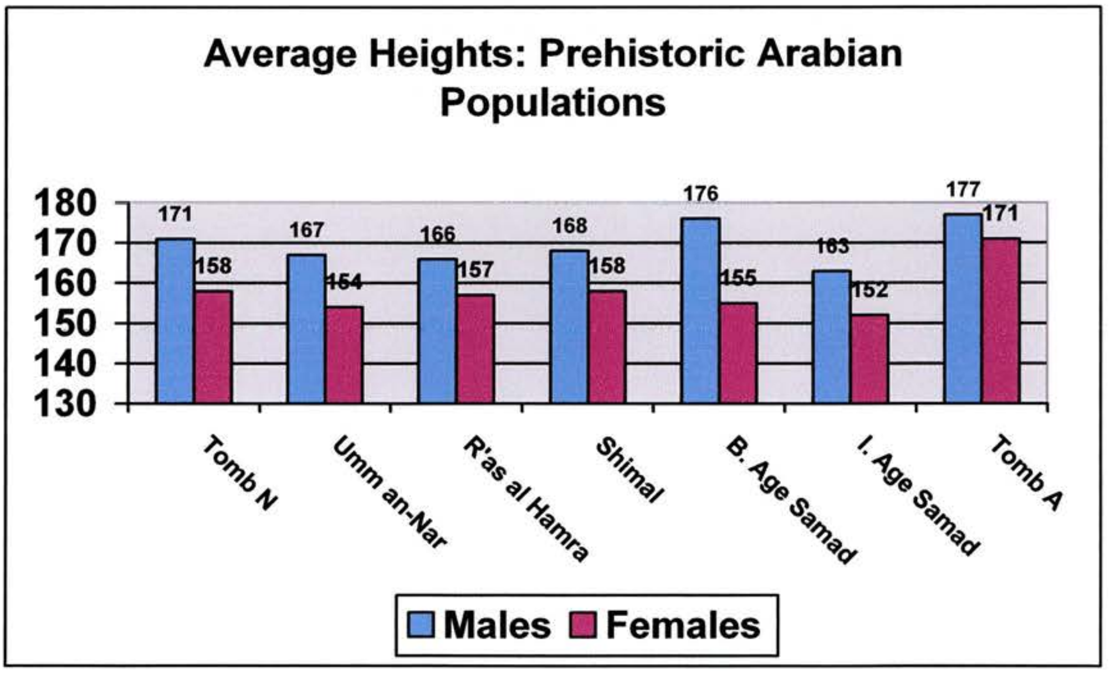

Figure 44: Average heights prehistoric Arabian populations.

These results demonstrate a disparity between most prehistoric populations in the area and those of Tomb A and Bronze Age Samad. It seems unlikely that the differences in stature are related to differences in diet. While one might expect such variations in stature from populations living in significantly different ecological environments with markedly different food resources available, it is unlikely that in such a small geographical area there would be major differences in the diets of populations living in coastal and inland communities. It is to be expected that coastal dwellers would make greater use of marine resources, while inland communities, largely sited in the oases with their abundant supplies of fresh water, would have greater proportions of fruit and vegetables in their diet. However, the cultural uniformity between the third millennium communities, as evidenced by the similarities in burial methods and artefacts, implies a high level of contact, and one must assume that this also involved trade. It is thought that one of the main commodities traded was copper. The mountains surrounding Al Ain were the main source of copper in the Arabian Peninsula (Cleuziou, 1998). One can also envisage fish being traded for fruit and vegetables. The fish would have had to be dried however. Until very recently, travel between Abu Dhabi and Al Ain, a distance of 160 kilometres, took seven days by camel (Al Fahim, 1995); fresh fish would have perished in the harsh heat during such a journey. Although ample supplies of fresh fish are readily available in Al Ain today, dried fish was a normal part of the inhabitants' diet until recently (Holton, 1991). Seasonal movements of communities may also have occurred. Prior to the oil boom it was common for the inhabitants of Abu Dhabi to move to the shaded inland oases at Al Ain and Liwa during the hot summer months (Al Fahim, 1995). Fresh fish would have also been available to these communities when in Abu Dhabi, which is situated on the coast.

Kunter did not have the advantage of the evidence from Tomb N, but even so, his speculation that differences in stature may be related to coastal and inland dwelling could not really be supported on the evidence he did have available. The site at Shimal, although not immediately situated on the coast, is only a few kilometres from it, and the inhabitants must have had access to food resources from the sea. The evidence of stature from Tomb N appears to rule out the possibility of a dietary connection to the stature differences among various inhabitants in the Arabian Peninsula. Average heights of the people of the island of Umm an-Nar are very similar to those from Tomb N, which is an inland site surrounded by desert. It is possible that the inhabitants of Tomb A were a social elite with better food resources and a generally higher standard of living. However, it seems highly unlikely that the diet of these people would be very different from those of Tomb N. Both sites lie in the same complex of oases, and are situated only a few kilometres apart. Both tombs are thought to be partly contemporaneous, although the artefactual evidence suggests that the end of the period of use of Tomb N was later than that of Tomb A (Méry *et al.*, 2001), there does not seem to be any substantial differences in the archaeological assemblages to indicate a different social status. Although there is little detailed anthropological information on the Tomb A inhabitants, they did appear to suffer some degree of the skeletal stress found in the Tomb N population, i.e., high infant mortality, young adult mortality, poor dental health and cribra orbitalia. The only clear difference that can be identified on the available evidence, apart from differences in average height, is the differing methods of burial, Tomb A inhabitants in an upright circular tomb and those of Tomb N in a pit-grave. Furthermore, the Tomb A population received the same burial rites as that of Umm an-Nar. The development of burial in pit-graves may be temporal; the only other similar grave is that at Mowihat B, Ajman, UAE which has been dated on the basis of the artefacts to the same period as Tomb N (Méry *et al.*, 2001).

It seems most likely that these differences in height are genetic in origin, and that there were two partly contemporaneous populations of different genetic origin living side by side. Having examined the human remains from both the original and current excavations of Tomb N, one does get an impression of the presence of some unusually robust individuals among a population that is of otherwise average robustness. Unfortunately, because of the fragmentary nature of the remains it has not been possible to present this information in a scientific manner, but it could, however, signify some mixing of the two populations. [17]

Despite periods of malnutrition during childhood, in most cases "catch-up" will occur, and adult height may remain unaffected. It is usually only prolonged and severe

[17] Although the Tomb A skeletal remains are in the care of the Department of Antiquities in Al Ain, it has not been possible so far to get access to the material for examination; hopefully this can be carried out in the future. The purpose of the analysis would be to assess Tomb A population height on the basis of metatarsal length in order to compare the results with that based on long bone length, providing an insight into the accuracy of the metatarsal method, and enabling a direct comparison to be made with the Tomb N population.

periods of malnutrition that affect adult height. This is also confirmed in the example referred to by Tanner of the Stuttgart children, where an immediate recovery in the post-war years is evident (1989). There are numerous studies comparing the heights of socially deprived children with affluent children. Therefore, although the evidence for mortality rates among children at Tomb N is high, and some form of metabolic disease appears to have been widespread, there is no clear evidence that the relatively small stature of the Tomb N adults is related to poor nutrition. In most developing countries, it seems that the diarrhoeal diseases of infancy are the most potent causes of growth restriction. The effect of unfavourable conditions on growth seems to depend upon the duration and the severity of the insult and also the age at which it occurs"(Evelyth & Tanner, 1990). Some adults clearly had periods of illness or malnutrition during childhood, but it is possible that this had no effect on adult height. Kunter (1991) claims that the longevity of the inhabitants indicated optimal living conditions at Umm an-Nar, and average height there was very similar to that of the Tomb N inhabitants.

5.4 Disease

Although incidences of joint, infectious and congenital diseases and trauma were recorded during the analysis of the remains of both populations and reported in Chapter 4, they will not be further discussed here. While some may have an indirect link to diet, for example in the case of joint disease caused by excess weight, in general, a discussion of their presence and prevalence is not within the realms of the subject of this study.

Dental Disease

The most striking feature of the dental health of the Hili inhabitants was the rate of *ante mortem* tooth loss. Of 361 jaw fragments belonging to adults, 65 % had lost teeth during life, and from a total of 1804 tooth places, 715 (40%) had been lost during life. Molar loss (71%) was greater than that of anterior teeth (15%), and there was 38% of premolars missing

Similarly high degrees of tooth loss during life have been reported from other prehistoric sites in the Middle East, dating to various periods. High rates of tooth loss have been found among ancient Egyptians (e.g., Ruffer, 1920; Koritzer, 1968); 76% of adults in Bronze Age, Iron Age and Islamic Bahrain had missing teeth (Littlejohn and Frolick, 1989); 91% of individuals from an Iron Age site in the Samad oasis, Sultanate of Oman, had lost teeth during life (Nelson *et al.*, 1999); Wells found a consistently high rate of *ante mortem* tooth loss among four sites in Ras al-Khaimah in the UAE (Wells, 1984 & 1985); Bondioli *et al.,* (1998, 233) report an "impressive number of *caries-related* (my emphasis) *ante mortem* teeth lost" from among over 300 individuals recovered from the late 3rd millennium collective tomb at Hili North Tomb A, Al-Ain UAE; and in a study of palaeodental pathology of the Ancient Mesopotamians, Carbonell (1966), from the 56 individuals studied, found 24 (43%) who were partly or totally edentulous.

Ante mortem tooth loss has also been found to be high amongst populations of the Middle East in more recent times. Dawson (1948), in a study conducted in 1946 of 994 Egyptian fellaheen (peasants), who had had no dental treatment, found that 73% of individuals over the age of 15 had missing teeth. Moreover, while the number of individuals with tooth loss increased with age, 63% of individuals aged 15-20 had already lost teeth.

The given reasons for these high levels of tooth loss during life are many and varied. Sir Armand Ruffer found that "chronic suppurative periodontitis" was the most frequent cause of tooth loss amongst the ancient Egyptians (Ruffer, 1920, 378). In another study of ancient Egyptian skeletal material, Koritzer, ruled out caries as the cause of tooth loss and concluded that the most likely cause was the synergistic action of attrition and periodontitis (Koritzer, 1968). Tooth loss in Bahrain in the Bronze Age, Iron Age and Islamic Bahrain was attributed to a high rate of caries in the first and second periods, and periodontal disease associated with calculus, in the Islamic Period (Littlejohn & Frohlich, 1989). Carbonell (1966) records the presence of advanced caries, heavy calculus associated with periodontal changes, and marked attrition, although she declines to hypothesise on the cause of this tooth loss because of the large number of teeth lost *post mortem*. In a study of skeletal material from burial mounds dating to 2000 B.C. in Bahrain, Hojgaard (1983) relates tooth loss to caries as a direct result of the consumption of carbohydrates such as dates, figs and raisins. (Interestingly, she also claims to have found evidence of tooth extraction.) Similarly, Nelson *et al.,* (1999) relate tooth loss in 37 individuals from an Iron Age oasis site in Oman, to caries as a probable consequence of eating dates. Of more recent populations, Dawson (1948) in his study of Egyptian fellaheen did not directly speculate on the specific cause of the loss, but implied that it was due to periodontal disease rather than caries. Again in more recent times, in an exercise to determine the extent of caries among the inhabitants of Lebanon conducted in 1961, Russell found that about one quarter to one third (the results varied between non-refugees and refugees) of the population aged 50 or over, were completely edentulous "principally from periodontal disease" (Russell, 1966, 958). Wells in his work on the human remains from Ras al-Khaimah, UAE (1984), found a high rate of *ante mortem* tooth associated with a low rate of caries and concluded that the cause of the tooth loss was "radiculitis" (inflammation at the tooth roots?). Carbonell (1966) in her examination of ancient Mesopotamians, did not comment on the cause of the heavy tooth loss, but stated that it was found in association with advanced periodontitis and heavy attrition.

Although a high rate of tooth loss during life is commonly reported from numerous sites in the Middle East, in a few cases low rates have been recorded. Hojgaard (1980), reports that from 3 collective graves dating to 2500 B.C. on the island of Umm an-Nar, UAE, only 31 teeth had been lost in vivo, out of 119 parts of mandibles and maxillae, and of 315 teeth either isolated or *in situ*, she found no caries. Goldstein *et al.,* (1976, 625), found a "surprisingly low" *ante mortem* tooth loss rate of 13% from two Bedouin sites from about 200 B.P. in the Israeli Negev. The authors found the rate surprisingly low because of an accompanying high rate of alveolar abscesses – 28% in maxillae and 9% in mandibles. Brothwell found an *in vivo* tooth loss rate of 12.6% for a Bronze Age skeletal series from Jericho (Brothwell, 1965). This was associated with a caries rate of 3% (11 cavities among 361 teeth).

Although there has been less emphasis on the dental health of populations in European prehistory, an increase in the rate of caries from the Mesolithic to the

Neolithic has been associated with the adoption of farming and an increasing reliance on cereals in the diet (see, for example, Meiklejohn & Zvelebil (1991)).

The above variations in findings and diagnoses clearly illustrate the complexity of dental disease in general. A variety of contributory factors may interact to result in disease and ultimately in tooth loss.

Lukacs (1989), in an attempt to simplify the complexity of dental disease, proposed a tentative classification of dental diseases and conditions and suggested that the various causal factors in dental disease should be thought of in terms of whether they are primary or secondary. Primary causal agents were said to be infectious, degenerative, developmental or genetic in origin. He gave by way of an illustration, *ante mortem* tooth loss, the primary causes of which were said to be caries, calculus and attrition, while other conditions, ultimately leading to tooth loss, are secondary. Thus, the pathway of eventual tooth loss from the three primary causes and subsequent secondary causes was said to be:

1) Caries-pulp exposure-abscess-resorption-tooth loss
2) Calculus accumulation-periodontal disease-abscess-resorption-tooth loss
3) Attrition-pulp exposure-abscess-resorption tooth loss. (Lukacs, 1989, 265)

In his paper Lukacs emphasised the complexity of interactions between dental diseases and their causes, and linked them to a multitude of factors, including trauma, developmental anomalies, toxic factors, and diet. Diet was one of the main protagonists, being linked to hypoplasia, caries, periodontal disease, attrition, and eventually, through a complex progression, to *ante mortem* tooth loss. The following diagram has been reproduced from Lukacs, 1989.

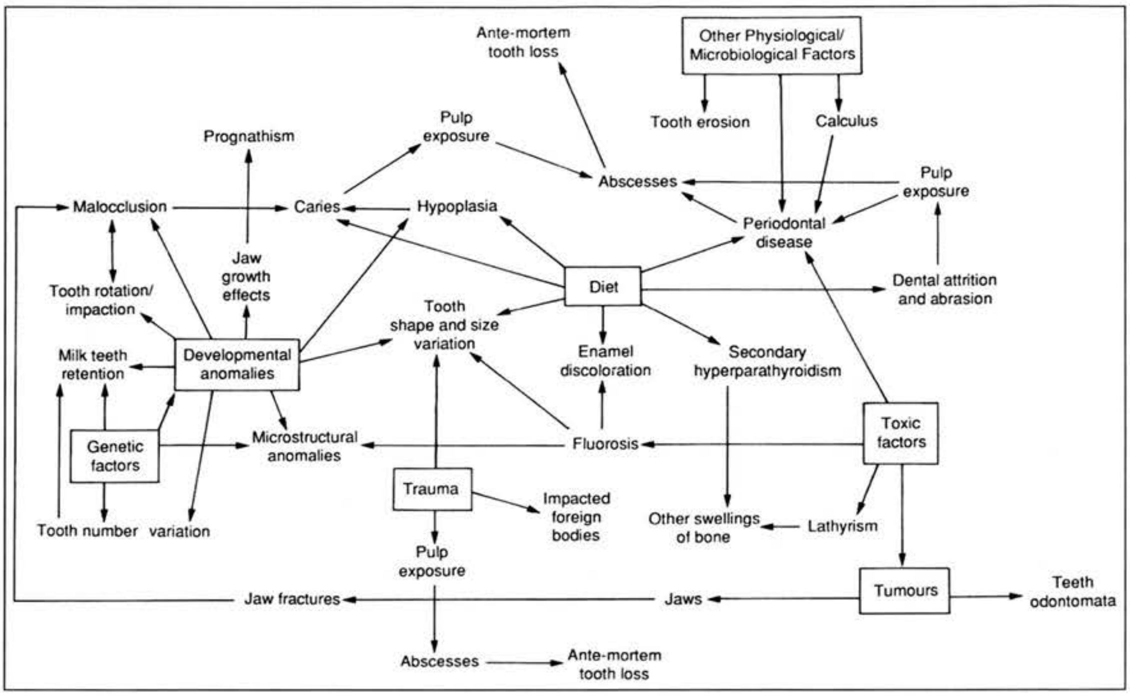

Figure 45: Interaction between oral diseases (After Lukacs, 1989).

Before it is possible to establish if one, or indeed a combination, of the primary causes proposed by Lukacs, i.e., caries, calculus or attrition, was responsible for the very high rate of tooth loss amongst the Hili population and others of the Middle East (and also, the reason for low rates in certain other sites mentioned above), it is necessary to understand the complex nature of dental diseases in general. Although the main causes of *ante mortem* tooth loss are advanced caries, periodontitis or attrition, other triggers such as trauma, extraction, genetic factors, or nutritional deficiencies could also be responsible. Indeed, it is quite possible that more than one cause may be involved.

Caries

Lukacs (1989, 265), in the first of his direct pathways to *ante mortem* tooth loss, indicates the caries route as follows: caries – pulp exposure – abscess – resorption - tooth loss. He goes on to say that “Caries is a progressive demineralisation of the tooth caused by localised fermentation of food sugars by dental plaque”(Lukacs, 1989, 265). Sugar is one of the three major groups of carbohydrates in food, the others being starches and cellulose and related materials (MAFF, 1985, 5). Sugars are formed in the leaves of plants by the action of sunlight, and are stored in the stems, roots, tubers or seeds, as starch. The starch then turns back into sugars upon ripening (MAFF, 1985, 9.). The main sugars found in plants are the monosaccharides, glucose and fructose and the disaccharide, sucrose, a chemical combination of glucose and fructose (MAFF, 1985, 5). Studies to assess the cariogenicity of food have found that diets containing sugar are most cariogenic, and sucrose, glucose, fructose and lactose (a sugar found only in milk) can all cause caries (Hillson, 1986, 293). Sucrose has been found to have the greatest effect (Hillson, 1996, 278).

There is little doubt, therefore, that sugar is directly responsible for dental decay. The change in diet in Britain during the Second World War when the amount of sucrose was considerably reduced, resulted in a decrease in the prevalence of caries. The caries rate increased again after the end of food rationing (Hillson, 1986, 293). Neale (1988, 186) mentions other contributory factors relating to diet. He proposes that sticky foods, which adhere to the teeth and remain in the crevices, provide an important host enabling bacteria to develop, and the frequency of eating is more important that the proportion of sugar in the diet. Hillson (1996) suggests that because the development of caries is so strongly linked with the sugar content of the diet, it can be concluded that a population with a high incidence of caries had a diet with a high sugar content.

However, there are many factors involved in the development of caries, diet being only one. Larsen (1997, 65) lists the essential ones as (1) the exposure of teeth surfaces to the oral environment; (2) the presence of aggregates of complex indigenous oral bacteria flora, salivary glyptoprotiens, and inorganic salts adhering to the tooth surface (dental plaque). He goes on to refer to other contributing factors, which can affect site distribution and the rate of caries development: crown size and morphology, enamel defects, occlusal surface attrition, food texture, oral and plaque pH, speed of food consumption, some systemic diseases, age, child abuse, heredity, salivary composition and flow, nutrition, periodontal disease, enamel elemental composition, and presence of fluoride and other geochemical factors. A further factor, not mentioned by Larsen is sex; women are said to be affected to a greater extent than men (Hillson, 1986, 295).

Carious lesions may present as opaque spots in the enamel, or as cavities in the enamel, which can progress until the crown is almost totally destroyed. This can allow bacteria to penetrate the pulp chamber, and can ultimately result in tooth loss. Progress may be rapid, a lesion may remain stable for long periods, or remineralisation may even take place (Hillson, 1986, 287).

Carious lesions may start wherever plaque adheres to the tooth: on the crown of a tooth or on the root, although the latter implies exposure of the root surface, and such lesions are likely to be more common in the elderly where resorption of the alveolus is more common. The site of carious lesions is important in understanding the cause of the disease. The most common site in modern populations is in the fissures and pits of cheek teeth, which can trap plaque, followed by the facets that develop at the contact points for adjacent teeth (contact caries). Lesions in the cervical region, along the gingival margin, are often commonly found, and roots exposed by periodontal disease can also develop caries. Carious lesions can develop at the site of hypoplastic defects in the enamel. Caries occur most frequently in molars, followed by premolars and then by anterior teeth (Hillson 1996, 280). The development of carious lesions increases with age. One would expect, therefore, that the older the average age of a population, the greater the caries rate.

Caries prevalence has changed throughout prehistory. From a very low rate among early hominids, it has gradually increased through the Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age, to a more rapid increase in Medieval and modern times. Similarly, the most common sites for carious lesions have changed, with a decrease in cervical caries, to more common pit and fissure caries, and a greater number of children affected (Hillson, 1996, 282). Many workers in the field associate an increase in caries prevalence in the Neolithic to the introduction of an agriculture-based economy and the increasingly important role played by carbohydrates in the diet.

Hillson in his recent paper on the recording of dental caries (Hillson, 2001) makes a case for the importance of the full recording of carious lesions. A bland statement based on caries rate is not sufficient. Caries should be considered along with the position of the lesion on the tooth, the tooth affected, the age of the individual, the degree of wear on the tooth, or, if this is not clear because of the gross nature of the carious lesion, the degree of attrition on the accompanying teeth, and information of accompanying *ante mortem* or *post mortem* loss.

The importance of this is clear when one considers the caries rate among the Schela Cladovei population. From a total of 32 individuals where the dentition was available for examination, three suffered from caries. At first glance, a rate of 9.4% of individuals affected appears high. Meiklejohn and Zvelebil (1991) report a rate of 1.9% for the European Mesolithic and 4.2% for the Neolithic, although it is not clear whether by caries rate they mean individuals or teeth affected. On the basis of teeth affected, the rate for the Schela Cladovei population would be 0.5% (3 out of 684 teeth), much lower than the estimated rate for the European Mesolithic. If the rate quoted for the European Mesolithic is per person, the Schela Cladovei rate is high. However, regardless of the rate, the underlying causes of caries must be taken into account.

One of the Schela Cladovei individuals affected (M17) was a male of about 21 years who had a large contact caries on the lower left M1. The cause of this carious lesion is not clear. All 32 teeth were present and none of the other teeth had carious lesions; the only other dental pathology noted in this individual was hypoplasia. Such developmental defects are known to predispose to caries attacks (Hillson 1986. p290). Another individual (M38), was an elderly female of at least 45 years who had a carious lesion on the occlusal surface of her upper left M1, which also had a large abscess pocket at the root. Dental attrition in this individual was very advanced and the crown of the affected tooth had been almost completely worn away. It is very likely that the cause of the caries and the associated abscess was advanced attrition that had allowed bacterial infection to enter the pulp chamber. The third individual (1983, SVI, Sq 10, 0.55), an elderly adult, had a small carious lesion on the occlusal surface of the lower right second molar (only the right mandible was present). This tooth also had gross, cupped wear. Therefore, of the three individuals who suffered from caries, in two cases this appeared to be associated with advanced attrition, and, while the cause of the contact carious lesion in the young male is not clear, he may have had a predisposition because of hypoplasia. It might be argued by some that a caries rate affecting 10% of the population is high; in this case it is more related to the age of the population than to the nature of the diet. It could be argued, however, that in the case of the Schela, diet did play a part, if only indirectly, in one of two ways, or indeed, both. A healthy diet and plentiful resources allowed the population to live to a greater age and so be more susceptible to caries as age advanced, or that the nature of their diet caused heavy attrition and allowed them to become more susceptible to caries[18].

The methods used in assessing caries rates are also important. It is not always clear what is meant by caries rate and whether it is the number of individuals affected by caries that is being portrayed, or the rate by tooth. In order to make comparisons, the type of statistic being used must be clarified. If it is by tooth, and there are numerous teeth lost, *ante*- or *post mortem* which may also have been affected by caries, then the rate is largely meaningless. The problems encountered in the assessment of caries rate among the Hili population highlight this. Very few mandible or maxilla fragments had teeth *in situ*. Most had been lost either during life or had fallen out of their sockets at some point between death and examination. Even where teeth were still *in situ*, in the vast majority of cases, these were so damaged that only the grossest caries could be identified. While there were numerous loose teeth among the Hili remains, the large number of individuals meant that teeth could not be matched to empty sockets. In addition, a large proportion of the loose teeth were unerupted at the time of death and not relevant to a caries count. There were far fewer erupted teeth than loose sockets, and any calculation of a caries rate based on loose teeth would probably be a gross under-representation. The problem of individuals versus individual teeth is also highlighted here, as more than one loose teeth could be from one individual.

[18] The Schela Cladovei population displayed unusual patterns of attrition, possibly relating to the use of their teeth as a tool. This question is discussed later in this chapter.

Periodontal disease

Lukacs (1989, 265), in the second of his direct pathways towards ultimate *ante mortem* tooth loss, suggests that periodontal disease is a direct development from the build up of calculus, i.e., "calculus accumulation – periodontal disease – resorption - tooth loss". Brothwell (1981, 159) associates calculus with periodontal disease, in so far as a build up of calculus deposits can irritate the gums and initiate periodontal disease. Hillson (1996) links periodontal disease directly with gingivitis - inflammation of the soft tissue covering the alveolar bone. He divides the development of periodontal inflammation into four stages, the first three of which he classifies as gingivitis, affecting only the gingivae, or soft tissues, with only the latter and fourth stage affecting the bone as periodontitis. He does, however, associate one of the two forms of calculus, sub-gingival, adhering to the root of the tooth (the other being supra-gingival, adhering to the crown), with periodontal disease. Sub-gingival calculus must be more prevalent in older individuals as roots become exposed with age through resorption of the alveolar bone or as continuous eruption during adulthood to compensate for attrition.

Hillson (1986) describes two types of periodontal disease – horizontal bone loss, which results in an even lowering of the alveolar bone and irregular bone loss, resulting in pockets of bone loss. Both conditions, gingivitis and calculus, require the presence of plaque deposits.

Dietary insufficiencies caused by scurvy, rickets, pellagra and intestinal parasites can cause periodontal disease (Dawson, 1948). A study conducted in 1946-1948 of 994 Egyptian fellaheen, aged 15 and over from a low income group who had had no dental treatment and carried out no form of dental hygiene, found a 97.7% incidence rate of periodontal disease and concluded that inadequate food intake and intestinal parasites, in addition to oral sepsis "are perhaps the most important predisposing factors to periodontal disease in Egypt" (Dawson, 1948, 523). Interestingly, Ruffer, while in Egypt collecting ancient pathological specimens, comments on the widespread nature of the disease throughout Egypt at that time, and relates meeting "many members of the present population who had lost most of their teeth through pyorrhoeah and were fast shedding the remaining few" (Ruffer, 1920, p372).

Many workers have used excessive linear alveolar loss as a diagnostic criterion for identifying periodontal disease. Clarke and Hirsch (1991) caution that it is important to differentiate between physiological factors affecting the distance between the alveolar crest and the cemento-enamel junction (CEJ), and pathological causes. The inclusion of physiological factors has probably resulted in an overestimation of periodontal disease among prehistoric populations. The physiological factors, which can increase the distance between the CEJ and the alveolar crest are continuous tooth eruption to compensate for tooth wear and continuing facial growth, which can occur well beyond the age of skeletal maturity, until the sixth decade. Clarke and Hirsch (1991) claim that while the changes in the facial structure are subtle, they can have a significant effect on the CEJ-alveolar bone relationship. The most important physiological factor, the authors claim, is continuous tooth eruption related to attrition, although both contribute to a "significant role in determination for CEJ-AC relationship" (1991, 244).

There is much disagreement on the subject of periodontitis among specialists. While Clarke and Hirsch claim that the prevalence of periodontal disease has been greatly over-recorded among prehistoric populations, and that its true prevalence was in fact rather low in the past, other workers have claimed the opposite. Hildebolt and Molnar (1991) consider that periodontal disease, although varying between populations, has been widespread in the past, but agree that there has been confusion with the diagnosis of the presence of the disease and its severity, resulting in over-recording.

Even with pathological causes, Clarke and Hirsch (1991) (and Hildebolt & Hirsch, 1991, 228) draw a distinction between periodontitis and localised pulpal-alveolar lesions, which they claim are not caused by periodontitis, but, while they can have a similar appearance to periodontal lesions, are caused by pulpal disease, and can result in tooth loss.

Calculus, the build-up of mineralised plaque on the surface of the teeth, claimed to be the initial stage in the pathway to tooth loss caused by periodontal disease, is thought to result from the activity of plaque bacteria on protein in the diet (Hillson, 1979;

Lieverse,1999). Y'Edynak (1989) found that while the majority of individuals from Vlasac had calculus, a greater proportion of males showed high degrees of calculus than females and suggested that this may be because males consumed more protein than females. It is accepted that a protein-based diet leads to the development of calculus, but whether heavier deposits of calculus in some individuals indicate that those individuals were consuming a higher proportion of protein than others is by no means certain; the development of calculus is a complex process and there are many other contributing factors (Lieverse, 1999). "The most common diseases to affect the teeth once they have erupted are related to dental plaque…" (Hillson 1996, p254). "Prerequisites for the disease (caries) are presence of dental plaque and fermentable carbohydrates in the diet" (Hillson 1986, p287. Why then should the Schela Cladovei population, who had moderate accumulations of calculus, have virtually no dental disease whilst the individuals from Hili, who had no, or only slight, accumulations, have such a high degree of dental disease. It is possible that the Tomb N group did have higher accumulations of calculus but the evidence for this has become lost *post mortem*; the surviving teeth from Hili were mostly loose, having become dislodged from their sockets. This action is very likely to cause any calculus deposits to fracture and fall off.

Lukacs third primary cause is attrition – pulp exposure – abscess – resorption – tooth loss. Tooth loss from this cause is clearly linked to age; the older the individual, the greater the age, the greater the chance of pulp exposure due to attrition. The nature of the diet is clearly another factor; a coarse diet will cause teeth to wear at a greater rate than a softer diet. Ruffer (1920) linked dental pathology in Egyptian felaheen (peasants) to attrition as a result of eating coarse bread.

Lukacks, in setting out the pathological processes of his three primary causes of *ante mortem* tooth loss does not make specific reference to diet, although his chart (shown at Figure 45 above) clearly demonstrates diet as central to the development of periodontal disease, abscesses, caries and tooth loss. As can be seen from this diagram, numerous other non-dietary factors can be involved. There was evidence of periodontal disease, abscesses and caries in the populations of both Tomb N and Schela Cladovei, although *ante mortem* tooth loss was largely restricted to the Tomb

N inhabitants. Ascertaining the causes of such conditions, however, is not straightforward.

Old age, associated with advanced attrition seems to be the main factor in the development of both dental abscesses and caries at Schela Cladovei. With the exception of one case, advanced age with associated marked attrition is linked to all of the individuals with dental disease. Therefore there does not appear to be a link between dental disease and diet at Schela Cladovei. At Tomb n, although a few instances of advanced attrition were noted, the poor survival of teeth meant that the general level of attrition could not be ascertained.

The difficulties involved in assessing the prevalence of caries among the Tomb N populations has already been discussed. The rate of both infections of the socket and periodontal disease are both high. Ninety-one jaw fragments displayed evidence of infections of the socket. In many cases there were several in the one fragment, often of an advanced nature. It is noted that Dias and Tayles (1997) postulate that in most cases references to abscess and abscess cavity are incorrect, and that in the majority of cases a diagnosis of abscess is not justified. It is accepted that at Tomb N because of the high number of empty tooth sockets enabling greater examination of the sockets than is normally the case, the number of socket lesions found may be artificially high. However, many lesions were of an advanced nature with frequent pus sinuses and would have been visible even if the teeth had been *in situ*. Kieser *et al*. (2001) found periapical lesions to have a strong association with advanced attrition in an early Maori population. Because of the loss of teeth both *ante* and *post mortem*, a similar association at Tomb N cannot be ascertained. The degree of periodontal disease at Tomb N was also fairly high with 36 fragments being affected. Periodontal disease was often accompanied by dental abscesses. *Ante mortem* tooth loss was present in all of the fragments with lesions of the alveolus and the sockets.

The evidence from ancient and modern populations in the Middle East indicates that, although in most cases dental health was poor, the causes are various. Of the prehistoric sites in the Arabian Peninsula, low rates of both tooth loss and caries were reported for Umm an-Nar, while high rates are apparent at Tomb A, Hili North, among other sites. The link with the consumption of dates, which were probably widely consumed, must at least be considered to be open to question. One local dental practitioner in the United Arab Emirates, who examined the Tomb N dental remains, was surprised to hear of the claimed link between tooth loss, caries and date consumption. He considered that the consumption of dates, still widely eaten today, would be beneficial to the teeth because of their fibrous nature. His view was that tooth loss was more likely to be linked to a vitamin deficiency, such as scurvy. The link between scurvy and tooth loss is well established (personal communication). It does not appear to have been a factor at Tomb N, however. A scorbutic origin for tooth loss which is confined largely to the molars is unlikely. One would expect the affected teeth to be of wider distribution in the dentition, with more anterior teeth being involved. Indeed, because of the different root systems of anterior and posterior teeth, it is more likely for anterior teeth to be lost because posterior teeth are more firmly anchored in the bone. (Mogle and Zias (1995).

In conclusion, although a high rate of tooth loss and poor dental health in general has been clearly established among the Tomb N inhabitants, the cause of that tooth loss is not clearly understood. It may well have been linked in at least some cases to caries, and in these individuals the link with diet is clear. However, the number of individuals with caries is not known, and as periodontal disease does appear to be the main cause of tooth loss in others, it is likely that the high rate of *ante mortem* tooth loss was due to more than one cause.

The dental health of the two populations was therefore remarkably different. That of the Schela Cladovei population, with the exception of one individual, was extremely good while that of most individuals from Hili was particularly poor. There is no strong evidence, however, to link these differences to diet.

Dental Attrition

Teeth start to wear almost as soon as they erupt. The gradual wearing down of dental enamel is caused by the abrading of the occlusal surfaces of the teeth against each other; this mostly occurs during the chewing of food, although bruxism, the grinding of teeth, usually unconsciously, the loss of other teeth in the dentition, and the use of the teeth as a tool, can also affect the pattern of attrition.

Although not a dental disease as such, tooth wear is closely related to the nature of the diet. Attrition advances with age and the most common reason for examining dental attrition in skeletal material is to assist in the assessment of age at death. The degrees and pattern of attrition on the teeth varies between populations, depending on the coarseness of the diet.

Several individuals from Schela Cladovei displayed particularly heavy attrition of anterior teeth, in the form of rounded polishing, when compared with molar wear. In some cases this was so severe that the incisors and canines were worn to stumps and had no enamel remaining (for example, the middle aged male M46 from the 1991 excavations) while there was only moderate wear on posterior teeth. In another case (M43, 1991 – a male in his 20's), probably displayed the most typical pattern of attrition. Wear on all his anterior teeth was greater than that on posterior teeth, that on the upper teeth was greater and more uneven than that on the lower teeth. The occlusal edges of the lower incisors were in a perfect straight line while wear on the upper incisors and canines was angled lingually and the enamel of the lingual surface was itself flattened and polished. The left upper central incisor was more heavily worn than the right, which in turn was more heavily worn that the lateral incisors. On another individual (M29) the wear on the palatal surface of the lower lateral incisors had completely removed the enamel. Similar, although not as advanced, polishing existed on the palatal surfaces of the upper central incisors. This was also the case with M47. Again attrition was much heavier on the anterior teeth, particularly on the upper front teeth. Again the palatal enamel on these teeth had completely worn away and occlusal attrition had reduced the length of the teeth to about 4 mm. This degree of wear is particularly striking when it is considered that this individual was only in his late 20's.

Another individual (M37 – 1988) had a groove between the upper M1 and M2 on both sides. Small chips were visible on the lower left PM2 and upper right lateral incisor.

Patterns of dental attrition are described for Padina (Zivanovic 1975) and Vlasac (y'Edynak 1978) and attributed to the crushing of hard substances, such as bones or nuts. Heavy attrition was common among individuals from Schela Cladovei; it was particularly heavy on anterior teeth and appeared to advance rapidly with age. Some examples of dental chipping, said to be present in both the Vlasac and Padina populations (Zivanovic 1975; y'Edynak 1978) have been noted among the Schela Cladovei population.

It is also claimed that in some cases heavy anterior tooth wear follows when posterior teeth are missing. Hinton (1981) found that where this was present among some American Indian tribes he studied, the wear was usually cup-shaped. With the exception of one individual at Schela Cladovei (M17, 1984, where a large carious lesion was noted at the lower left M1and the upper right M3 was missing) none of the individuals where unusual wear was noted had lost posterior teeth during life. Furthermore, anterior wear amongst the Schela population took the form of rounded polishing of the occlusal surface and flattening of the whole length of the lingual enamel.

A common pattern of attrition amongst the Schela Cladovei population therefore was a greater degree of anterior wear compared with posterior wear. By and large this wear was rounded and involved both the incisors and canines. In every case the upper dentition was more heavily worn than the lower. An interesting feature was the polishing and flattening of the lingual surfaces of the upper teeth. (I could find no record of this type of wear being described in any of the literature.)

Brothwell (1981, 71) refers to earlier claims that abnormal anterior tooth wear among Eskimo women was due to the chewing of hide. Hinton (1981) studied dental attrition in four aboriginal groups, two of which were largely hunter-gatherers (Eskimos and

Aboriginal Australians) and two with some dependence on food production (Southwest U.S. and Ohio American Indians). He found that only in the two hunter-gatherer groups did anterior tooth wear exceed posterior wear and that the degree of wear increased with age. He concluded that this was associated with non-masticatory use of the teeth, although did not give any reasons why he had reached that conclusion, other than suggesting ethnographic parallels in Eskimo populations. He did also state that rounded wear was more advanced in the lower than upper dentition and suggested that this might be caused through pulling outward and downward. While, such anterior wear could expected to be found among a Mesolithic population, it is not the case amongst the Schela Cladovei population that wear was more advanced in the lower dentition. In all cases where both the upper and lower dentition was present, wear was much more marked on the upper dentition. The wear in the Schela Cladovei population may therefore be related to cultural practices.

Merbs (1983) described tool use by the Sadlermiut Inuit population of northern Canada. Men were said to use their anterior teeth primarily as a vice or pliers. Activities such as holding a fishing line, towing a seal, holding a bow drill, crushing the heads of birds and cracking seal bones are described. Women used their anterior teeth in the preparation of animal skins for clothing, including biting the skin to soften it and to remove fat and grasping it to scrape, stretch and cut it.

One individual from Schela Cladovei, a middle aged male (M29, 1986), had damage to his teeth which may have been caused by the type of male activities described by Merbs. This damage took the form of fresh chipping on the occlusal-buccal-distal edge of the lower left second premolar, loss of anterior enamel along the whole length of the crown of the upper right lateral incisor, exposing the dentine which also showed signs of wear, and small chips were visible on lower right lateral incisor. However, with this exception, it is unlikely that any of the male activities would result in the typical type of anterior tooth wear such as that found at Schela, although it is possible that tasks such as softening and stretching animal hide might. Nevertheless, it is likely that some form of division of labour existed among the males and females at Schela Cladovei because most of the individuals with marked anterior tooth wear were males.

Wallace (1975) discusses the hypothesis that incisor rounding amongst Neanderthals was the result of using the teeth as a tool as proposed by C. Loring Brace. He describes the pattern of anterior attrition in La Ferrassie 1 where rounded wear was present on the buccal incisal edges of the lower central incisors, upper incisors and upper canines as on the lower teeth rounded downward and outward, while on the upper teeth as rounded upward and outward. He examined dental casts from Kalahari Bushmen and found that "(1) both males and females have rounded incisors; (2) rounding is absent in children or young adults, appearing in middle age and increasing with age; (3) central incisors are more rounded than either lateral incisors or canines; (4) with age, rounding extends distally to the cheek teeth; and (5) that individuals with rounded incisors have an open bite" Wallace (1975, 394). He suggests that rounding may be due to pulling meat over the teeth to shred it. He concluded that La Ferrassie 1 did not have rounded anterior teeth because he used his teeth as a tool, but because of contact with abrasives in the food.

It is not clear from the above whether morphology plays a part in the pattern of attrition. The Schela Cladovei population had a very marked edge-to-edge bite. It is very likely that cupped posterior attrition was related to diet, while that of the anterior teeth might well have been due to the use of the teeth as a tool. However, the exact form of use must remain speculative.

Although a few instances of advanced attrition were notes, the poor condition of the Tomb N teeth mean that little can be said about dental attrition.

Metabolic Disease

Numerous fragments of bone with pathological changes that may be indicative of the presence of a fairly high frequency of one or more of the deficiency diseases were identified from Tomb N. Numerous cranial and orbital fragments with marked lesions were noted. Most of the fragments with cranial lesions were from the parietal, although some of the fragments could have been from the frontal bone. A detailed description of these lesions is given in Chapter 4.2.

The hypertrophic raised lesions on the external surface of the cranium are labyrinth-like in form in some cases. The outer table of the cranium is either thin or destroyed, although the inner table is usually unaffected. Cranial wall thickness can be greatly increased at the affected area. The diploë in many cases appears to be more porous than normal. Many of the lesions are present on immature cranial fragments. Unfortunately, because of the nature of the Hili material, lesions have largely been found on isolated, mostly small, cranial fragments, and not on whole skulls or skeletons, and so the full extent of the skeletal changes cannot be established. A very young age for many of the affected individuals is suggested by the thinness of the cranial vault and the fine texture of the bone. However, while it seems that these fragments were from very young children, without the benefit of associated bones from other parts of the skeleton, it is not possible to provide an accurate assessment of age.

The cause (or causes) of the lesions found on the Hili remains is difficult to establish, primarily because there are several conditions that can have a very similar effect on the skull, and also partly because of the fragmentary nature of the Hili material. The main dietary related conditions said to cause bony changes in the skull, such as those found amongst the Hili remains, are rickets, scurvy and iron deficiency anaemia. Other non-dietary related diseases that can affect the skull in a similar way include thalassaemia, a genetically determined anaemia.

The aetiologies of rickets, scurvy and iron deficiency anaemia have already been discussed in Chapter 1 and will not be repeated here, although for the purpose of assessing the cause, or causes, of the cranial and orbital changes to those affected Tomb N individuals, some further comment on the characteristics of the diseases are required.

Until recently, rickets was a common disease of early childhood in western societies. The disease is unlikely to develop before the age of 4 months, is most frequently seen between the ages of 6 months and 2 years, and is unlikely to develop after 4 years

(Ortner & Putschar, 1981). The skeletal changes associated with rickets are most marked on the ribs, femur, tibiae and fibulae, and the arm bones. Demineralisation causes bending of the bones of the legs or arms on walking or crawling, and deformation of the thorax. These characteristic changes in the long bones and ribs can be accompanied by thinning of the cranial vault. Other skull changes can include thickening of the cranial vault as a result of external subperiosteal bone deposition. The outer and occasionally the inner table can disappear so that the thickness of the cranial vault has the appearance of thickened diploë (Ortner & Putschar, 1981 p275). Photographs of examples of rachitic skulls produced by the afore-mentioned authors indicate that the appearance of the skull changes can vary. In one case, the outer table had a fine porous appearance, in another, the changes were more labyrinth-like in form, described by the authors as "subperiosteal bone deposition with pronounced vascular pattern" (Ortner & Putschar, 1981, 275-276). Bone deposits are also said to occur on the bones of the face. Although details are not given in the text, a photographic example illustrates the case of a 3-6 year old child with bone deposition on the glabella, maxilla, mandible and orbits.

Osteomalacia is the adult form of rickets. The skeletal manifestations of the disease in adults are less pronounced than in the child because the body has stopped growing. A general demineralisation of the bones occurs which can result in increased porosity throughout the skeleton. The changes are said to be most marked in those bones with a high proportion of cancellous bone, which have a higher remodelling rate than more dense bone. (Ortner & Putschar, 1981). The most common effects are collapse of the vertebrae and deformity of the pelvis, which can be very difficult to distinguish from osteoporosis (ibid.; Roberts & Manchester, 1995). According to Ortner & Putschar, subperiosteal bone deposition does not occur, although one example of fine pitting and slight periosteal bone formation on the external surface of a calvarium is depicted.

Scurvy or vitamin C deficiency can cause marked skeletal changes. Small amounts of vitamin C can be acquired from milk and liver, but in most diets is derived from vegetables and fruit. Dried fruits, however, contain no vitamin C. (Ministry of Agriculture, Fisheries & Food, 1985). Because the body can store vitamin C, the disease normally takes several months to develop. Aufderheide and Rodriguez-Martin state that symptoms usually start to appear about 1 to 3 months after the interruption in vitamin C intake (1998, p311).

There seems to be little doubt that scurvy did exist in the ancient Near East. Ancient Mesopotamian texts suggest that the disease existed in Babylon and Jerusalem (Wilson, 1967, pp192-194), and was mentioned in the Old Testament and the Talmud as the stinking disease (Mogle & Zias (1995) although it appears to be rare today in the Middle East (Patwardham & Darby, 1972)

Infantile scurvy does not exist at birth, even if the mother suffered from the deficiency, and, according to Ortner and Putschtar (1981, p270), takes several months to manifest itself, seldom developing before 4 months of age. Stuart-Macadam (1989, p202), citing Goodhart and Shils, states that the disease most commonly develops between 5 and 24 months of age, peaking between 8 and 11 months. It is perhaps likely that in the past, when infants would have been fed human milk either from the mother or a wet nurse, that scurvy would not have developed until some time after weaning.

The most apparent consequence of scurvy is subperiosteal haemorrhaging, which can occur anywhere in the body, but most commonly in the gums, on the skin, beneath the periosteum of bones or synovia of joints. (Stuart-Macadam, 1989, p203). With the exception of changes to the dentition (the possible connection between dental pathology and scurvy amongst adults is discussed elsewhere), the skeletal manifestations of the disease are most marked in infants. Infantile scurvy most commonly results in changes to the ribs, tibia and femur. Bony changes to the skull are less common but do occur, especially in the upper orbits and according to Ortner and Puschter (1981, pp270-272), subperiosteal haemorrhaging can occur on the frontal bone (although it is unclear whether they are speaking entirely about orbital changes or are also inferring to changes to other parts of the frontal. They go on to discuss the question of whether porous lesions of the skull can be attributable to scurvy and cite various workers who have attributed such lesions to the disease. They do not themselves offer any examples or include any photographs, and suggest that in those cases where cranial lesions have been found on scorbutic patients, the lesions may have been due to associated rickets or anaemia. They conclude by stating, however, "it would seem prudent to consider scurvy as a possibility when such a lesion is found on an archaeological specimen" (1981, p273). However, one of the authors in a subsequent paper (Ortner & Ericksen, 1997) attributes bilateral and porous or hypertrophic changes on the skulls of children to scurvy. Associated with all of the examples given in the paper are bilateral porous changes to the greater wing of the sphenoid that the authors claim is pathognomonic of the presence of scurvy. They also accept that an earlier claim that changes to the zygomatic area in some cases of scurvy is feasible. Other skull lesions that they claim are attributable to scurvy are in the orbital plate, the mandibular ramus, the posterior maxilla and the palate.

It has been widely claimed that iron deficiency anaemia causes changes to the cranium (porotic hyperostosis) and orbit (cribra orbitalia) (Stuart Macadam, 1989; Ortner & Putschar, 1981; Lewis, 2000). The changes take the form of "thinning of the outer table of the skull, due to vertically orientated trabeculae in the diploë, causing pressure of the table (the hair-on-end appearance radiographically), and thickening of the diploë between the two skull tables....the orbital roof are affected in the form of holes in the bone surface (cribra orbitalia)" (Roberts & Manchester, 1995, 167).

"The skeletal changes appear to come in two forms: the orbital lesions alone, and both orbital and vault lesions together" (Roberts & Manchester, 1995, 167). Lewis (2000) states that both types of lesions commonly occur together in North American examples, but that they rarely occur together in Europe, porotic hyperostosis being rarely recorded.

There appears to be some confusion concerning the form of orbital lesions. Fairgrieve and Molto (2000) in analysing cribra orbitalia in two populations from Dakleh Oasis, Egypt, use Steinbock's (Steinbock, 1976) definitions for three types of orbital lesion – the *porotic type* "characterised by scattered fine openings affecting the roof of the orbit"; the *cribrotic type* with "openings larger and more numerous, tending to coalesce into larger apertures"; and the *trabecular type*, which "exhibits small openings coalescing into large, irregular apertures often arranged in radiating patterns from one or more centres in the orbital roof". Fairgrieve and Molto further classify the lesions using the system of Mensforth *et al.,* (1978) into "healed" and "reactive" lesions, and provide photographic examples of each of the two types. It is not entirely clear from the paper how Steinbock's three types relate to the classifications of healed and reactive lesions. From the descriptions and photographs included, it appears that healed lesions equate to the *cribrotic type* and active lesions to the *trabecular type*, but there is no indication whether the *porotic type* was considered to be healed or reactive. Lewis (2000) states that care should be taken to differentiate between healed lesions "filled holes with rounded edges" and active lesions "sharp-edge, or 'hair-on-end'". She does go on to state that both types of lesions could occur together if there had been a reoccurrence. Lewis's description of healed lesions appears to differ considerably from that of Fairgrieve and Molto. Mogle and Zias (1995), in discussing a possible case of scurvy where the individual had, among other changes, bilateral destructive lesions in the orbital roofs, emphasise the fact that in cribra orbitalia the lesions are proliferative. Stuart-Macadam used a combination of a grading system of 6 stages of lesions, including normal bone to severe outgrowths, and areas, by dividing the orbit into 9 sectors, in order to systematically record the occurrences and degrees of orbital lesions at Poundbury Camp (Stuart-Macadam, 1991 (2), 109).

"Thalassaemia is a hemolytic anaemia caused by a genetic defect in the hemoglobin structure" (Ortner & Putschar, 1981, 251). It is thought to be an evolved response to malaria and it tends to occur in the same geographical areas (Brown, 2000; Ortner & Putschar, 1981, Aufderheide & Rodríguez-Martin, 1998). There are two basic types, heterozygote (thalassaemia minor) and homozygote (thalassaemia major). Thalassaemia minor has no skeletal effects, while thalassaemia major has pronounced skeletal manifestations and has a very high mortality in infants and children. The few adult survivors have a limited life span. There is also an intermediate form which may cause skeletal lesions (Ortner & Putschar, 1981). Beta thalassaemia is present today in the Middle East (Ortner & Putschar, 1981; Roberts & Manchester, 1995), and, based on local knowledge, is also a problem in the United Arab Emirates, so much so that very recently the UAE government was advising couples about to be married to have blood tests. The skull of a child of about 7 years from a 16th-19th century grave in Israel with porotic hyperostosis, cribra orbitalia and thickening of the diploë, was the subject of DNA analysis (Brown 2000). Results showed that the child suffered from thalassaemia rather than dietary related iron deficiency anaemia.

Besides cranial changes of the porotic hyperostosis 'hair-on-end' form, the maxilla and zygomas are expanded, development of the maxillary and sphenoid sinuses and mastoid cells are delayed, the diameter of the ribs is expanded, fish-like vertebrae develop, there is expansion of the metacarpals, metatarsals and phalanges and the long bones show marked widening of the medullary cavity, and premature fusion of the growth plates can result in dwarfism (Ortner & Putschar, 1981; Aufderheide & Rodríguez-Martin, 1998).

Periosteal skull lesions can also occur. Ortner and Putschar (1981) provide a photographic example. A view of the top of the vault of the skull shows a lesion that from the appearance of the external surface is very similar to porotic hyperostosis. However, a close-up of a cut section of bone demonstrates quite clearly that additional bone has been laid down on top of an intact cortex.

Several fragments of cranium of excessive thickness were noted on the Tomb N remains. The form of these is discussed in full in Chapter 3. The cause of this excessive vault thickness is not clear. Meiklejohn and Zvelebil (1991) report on a number of Mesolithic individuals from Denmark with exceptionally thick cranial vaults, and suggest that one of the causes may be infestation with fish tapeworms. They do not indicate, however, whether there were any associated bony changes on the vaults. Excessive cranial thickness has also been said to be a consequence of malaria. Stuart-Macadam (1989) describes the effects on bone with healing of scurvy as increased thickening of the cortex as well as increased definition of the trabeculae, which can remain for many years. Brothwell and Blake (1966) relate abnormal thickening of crania from Fussell's Lodge long barrow to either slight anaemia or rickets. Are we seeing the effects of old metabolic disease among these individuals? It is possible that lesions of porotic hyperostosis, active during childhood, develop into general thickening of the cranium, once disease is no longer active.

One of the problems in attempting to attribute the Hili skull lesions to any of the above diseases is that the manifestations of all of these diseases appear to be very similar. The can also co-exist (Ortner and Mays, 1998). An examination of the published examples has revealed that it is extremely difficult to differentiate between them. This problem of distinguishing between scurvy and anaemia in skeletal samples is discussed by Ortner *et al.* (1999). This could be partly because of the similarity in the changes, partly because some of the cases may have been misdiagnosed, or indeed because more than one condition is present in the individual. This problem is acknowledged by Ortner and Ericksen (1997, 218) who state:

> "The porous lesions that we are attributing to scurvy do resemble the abnormal bone tissue seen in anaemia and infection. It is possible that some stages or expressions of the lesions could overlap to the extent that differential diagnosis would be difficult or impossible."

However, of critical importance in the diagnosis in any of the above diseases is the **distribution** of lesions (Ortner & Erickson, 1997). Unfortunately, because of the condition of the Hili remains, fragments of affected bone appear in isolation and the distribution of lesions in any of the individuals concerned is unknown. However, while it is not possible to assess the extent of pathological changes in individual cases, it may be possible by examining the distribution of lesions in the tomb as a whole and taking into account other factors such as age at death, if not to identify the presence of a specific disease, to at least discount the presence of one or more diseases which may enable a reasoned conclusion on the most likely disease to be reached.

Therefore if rickets or scurvy, or indeed thalassaemia, had been responsible for the lesions of the cranium and orbit, one would expect to find skeletal changes normally associated with those diseases. Besides skull changes, Appendix 31 lists other lesions that may be associated, although these are relatively few in number. One fragment of malar, and the zygomatic process of the temporal bone, both with fine pitting were noted. The mandible of a 6-month-old child also had pitting on the external surface, and one fragment of rib had periosteal reaction. However, these other pathological changes are much fewer in number than fragments with cranial pathology and non-specific in nature, and their presence do not support a diagnosis of rickets, scurvy or thalassaemia. In addition, no evidence of bending of the long bones was noted, which would appear to eliminate rickets. Therefore it must be concluded that the cranial lesions on the skulls of the Hili individuals are not due to scurvy, rickets or thalassaemia.

By process of elimination it is likely that the Tomb N individuals suffered from one of the forms of anaemia, although as all anaemias have a similar effect on the skeleton, whether they are related to diet or disease, it is not possible to establish that iron deficiency was the cause.

It seems clear that that anaemia has been prevalent in the Middle East, both in prehistoric and recent times. In a review of the palaeopathology of the Middle East Arensburg (1985) reports that porotic hyperostosis appeared for the first time in the Neolithic and subsequently appeared with relatively frequency. He makes specific reference to sites in Israel where it was found that "During the War of the Jews against the Romans, more than 90% of the remains of children were affected with cribra orbitalia" (Arensburg, 1985, 30). Early in the 20th century in Egypt anaemia was found to be widespread and thought to be due to the interaction of malnutrition and parasitic infection (Patwardham and Darby, 1972, 57). The link between anaemia and parasitic infection is interesting in view of the fact that it is thought that anaemia resulting from iron deficiency strengthens the body's defences against infection (Stuart-Macadam, 1991). Stuart-Macadam states that " In areas where the load of pathogens (viruses, bacteria, fungi, parasites) is high, it would be expected that greater numbers of the population would cross the threshold between an iron deficiency as an adaptive response, and an iron deficiency anaemia" (1991, 38).

No evidence of porotic hyperostosis or cribra orbitalia were noted on the Schela Cladovei bones, although, in their study of the palaeopathology of remains of 117 individuals from Vlasac, Nemeskéri and Lengyel (1978) cite evidence of possible diet-related conditions. They report evidence of rickets in11 children, osteomalacia, the adult equivalent of rickets, in 11 adults, scurvy in 3 children and 2 adults, and osteoporosis in 3 males and 2 females. All of these conditions produce distinctive skeletal changes and both are relatively rare in the palaeopathological record. The diagnosis of these conditions on 27 skeletons from Vlasac appears to be based entirely on biochemical analysis of bone. In the palaeopathology section of Nemeskéri and Lengyel's report on the anthropological data from Vlasac (1978), where the pathological lesions of other conditions were otherwise detailed, none of the lesions normally associated with vitamin C and D or calcium deficiencies were described for those individuals said to be suffering from the diseases.

Equivalent evidence is either absent or rare in other Iron Gates sites. Zivanovic (1975) describes bony changes on an individual from Padina very similar to those of rickets. Neither scurvy nor rickets/osteomalacia is reported from Lepenski Vir and none of the characteristic bony changes have been noted on the skeletal material examined so far from Schela Cladovei.

Given that the original Ca and vitamin levels in the Vlasac bone could have been altered by diagenesis following burial, and the lack of any description of characteristic macroscopic bony changes, indicating that there were none, these interpretations must be regarded with caution.

In any case, as observed by Meiklejohn and Zvelebil (1991), vitamin D and/or calcium deficiency would be surprising in populations with access to abundant fish resources, since fish are an important source of both nutrients. Zivanovic (1975) also thought it unlikely that a primitive population, spending a great deal of time in the open, would suffer from vitamin D deficiency, but attributed the single instance at Padina to the fact that the site was situated in a deep gorge with limited exposure to sunlight. It is also possible that the presence of rickets in this one individual was the result of disease or an inherited disorder.

Hypoplasia

Hypoplasia is a defect in dental enamel caused by disturbances during growth. These defects normally occur in bands running round the crown of the tooth and are usually found on other teeth in the same dentition that developed at the same time. The disturbances can take the form of pits, single grooves and a series of grooves. The bands are associated to a particular period of periods of development (Hillson, 1986, p129). By noting the location of the defect on the tooth – mostly by measuring the distance from the cervical-enamel junction and comparing this with the stage of dental development for a given age, one can assess the approximate age at which the disruption occurred.

While a variety of conditions, including congenital diseases such as congenital syphilis, can trigger dental hypoplasia, the most common causes are considered to be nutritional deficiency and childhood illness. Hillson (1996, pp 165-166) gives some examples of studies carried out. He refers to a study by Sweeney *et al.,* (1971), which related enamel defects to malnutrition, and although it is said to be more difficult to directly relate enamel disruptions with childhood disease various workers have found higher frequencies in children who have suffered from rickets, chickenpox, convulsions, diarrhoea, diphtheria, measles, pneumonia, scarlet fever, vomiting and whooping cough. In addition, the frequency of lesions occurring between 2 and 4 years indicate that weaning may be a cause (Lewis, 2000).

One of the main problems in assessing the level of hypoplasia among populations is differentiating hypoplastic lesions from perikymata, naturally occurring ridges on the enamel surface. It is very likely that the levels of hypoplasia among prehistoric populations have been over-recorded because perikymata have been recorded as hypoplasia.

Hillson (1979) links a maximum hypoplasia frequency of 40% among ancient Egyptian populations to dietary deficiencies and febrile disease and to vitamin D deficiency, the latter caused by insufficient exposure to sunlight, poorly nourished mothers producing vitamin D deficient breast milk and a vitamin D deficient diet in later childhood.

Only two of the 71 examined individuals from Schela Cladovei had hypoplastic lesions. However, Y'Edynak (1989) reports that 70% of teeth examined from Vlasac showed evidence of hypoplasia. In an earlier paper (y'Edynak 1978) she indicates that the degree of frequency was lower in later horizons. She concludes that the evidence for hypoplasia indicates generalized stress through the first five years of life and in some cases severe physiological disruption continuing beyond then.

It is not clear from the published data whether hypoplasia was present among the Padina population. Zivanovic (1975) does not mention its presence, while y'Edynak (1978) though briefly referring to hypoplasia in the course of discussing the dental evidence from both Padina and Vlasac, does not make clear whether she is referring to both sites or only to Vlasac.

As was previously mentioned, the prevalence of hypoplasia appeared low in the population from Schela Cladovei. Two important factors, however, could have hindered detection; heavy attrition, particularly of anterior teeth, and adhering calculus. In addition, the surfaces of teeth of some individuals were obscured by adhering post-depositional concretions. The prevalence of hypoplasia might otherwise have been found to be greater were it not for these factors. However, this is speculative, and it must be concluded that there is little evidence to show that the Schela Cladovei individuals suffered from periods of malnutrition or disease during childhood.

The prevalence of hypoplasia among the Hili individuals has already been discussed. It is clear that several individuals suffered a period or several periods of malnutrition or disease during childhood. This is also supported by the high infant mortality and the frequency of the cranial lesion.

However, it is difficult to distinguish between the relative contributions of diet or disease to these stress markers. Quoting from other sources, Goldstein *et al.,* (1976, 634) in a study of Bedouin groups state:

" many children were being born with a poor prospective of survival beyond the first decade. Infant mortality was due not only to common factors of poor nutrition and hygiene, but to epidemics of measles, the dysenteries and other acute infections. After the years of early maturity death again began making inroads. There were few industrial accidents of course, but the women, worn out by manual labour and child-bearing, began in their thirties to look like old crones, and men were subject to physical stresses in work and climate. There were no barriers to the spread of tuberculosis, many succumbed to it – and to amebiasis. Pneumonia was very common, and the anaemia caused by hookworm".

"many Bedouin, including wealthy people, suffer from nutritional deficiencies caused by their unbalanced diet. This results in anything from a general state of physical weakness to tuberculosis, to which Bedouins are more prone than any other section of the population..(and) diseases are made more contagious by the closeness of living in a small tent".

CHAPTER 6. CONCLUSIONS

Some of the problems encountered in trying to establish connections between health and diet in any study of prehistoric populations are laid out in Chapter 1. To summarise, the outcome can be affected by:

1. The condition of the human remains.
2. The thoroughness of archaeological retrieval methods.
3. Population size and composition.
4. The inaccuracy of osteological methods used in the assessment of age, sex and stature.
5. The non-specific nature of some pathological lesions, which can preclude the accurate diagnosis of some diseases.
6. Inexperience on the part of the examiner.
7. The difficulty in assessing the contribution of genetics to height and robustness.

Several of the above factors have affected the degree by which the connections between health and diet can be established in each of the skeletal populations examined.

Condition of the Human Remains

The condition of the human remains did not seriously affect the analysis of the Schela Cladovei remains. There were many fully articulated skeletons, bone survival was especially good, and, although in some cases hard and solid calcium carbonate concretions adhering to the bones hindered the full assessment of some conditions such as hypoplasia, in general the fine silty soil had no doubt helped to preserve the remains. Conversely, the condition of the Tomb N bones had a major impact on the value of the assessment of the population profile. Average stature was particularly difficult to assess because the only suitably complete bones were the metatarsals, which provide less accurate results than calculations bases on the long bones. Even using these bones calculations of height could only be attempted for about 20% of the adult population. As sex cannot be accurately ascertained from the metatarsals, average height for males and females had to be assumed. Although the ages of children could be assessed fairly accurately from dental remains, very few adults could be aged to even a broad category. As a consequence very little is known about the longevity of adults. Sex was largely assessed on the basis of long bone dimensions, thought to be less accurate than those based on the pelvis and skull. There was ample evidence for disease, but this had to be considered on the basis of isolated fragments, preventing the full extent of disease in any individual to be evaluated, or a diagnosis to be made in many cases. It is also very likely that, in view of the degree of fragmentation, some pathological lesions will have been missed.

Archaeological Retrieval Methods

There is no evidence to suggest that excavation techniques used were lacking, although, in both cases, retrieval methods were subsequently improved upon: at Tomb N in the recent re-excavations conducted by specialist field anthropologists and at Schela Cladovei with the commencement of the joint British-Romanian project. The failure to compile inventories of the excavated human remains, and poor storage conditions, however, both contributed to the loss of data in both populations.

Population Size and Composition

The small size of the Schela Cladovei population somewhat reduces the value of demographic profile obtained. It is not clear whether the relatively few immature remains are a feature of low child mortality, different burial practices or whether children were largely buried in a part of the site not yet excavated. In addition to the question mark surrounding immature burials, there was a large number of disarticulated isolated bones not taken into account, many of the excavated skeletons are missing, and it is quite possible that the site was used on a seasonal basis and other parts of the population are buried elsewhere. It is clear that the true number of individuals in the group would have been much greater and the number examined are probably not representative of the whole population.

In contrast, the Tomb N population, with 447 individuals, was much larger, and the age profile of the inhabitants suggests that the examined remains were more likely to be representative of the whole population. Excavation of the tomb, using more precise methods aimed at maximising anthropological information, is still ongoing and final population size will probably be in the region of about 600. Initial findings from the newly extracted data suggest a very similar population composition.

Accuracy of Osteological Methods

One of the main problems faced in any study of prehistoric skeletal remains is the absence of comparative data on age at death and sex of the population being examined. It is therefore necessary to rely on those studies that have been carried out and published. Unfortunately, many have been based on modern populations, and may not be directly applicable to prehistoric populations. For example, in the case of calculations of stature, there is no way of knowing whether relative skeletal dimensions now were the same in the past. Similarly, standards based on studies carried out on other prehistoric populations may not be representative of the population to which they are being applied. Brothwell's dental attrition rates are a classic example of this. Despite the fact that they were based on British skeletal populations, are frequently utilised elsewhere. However, in the absence of comparative published standards, it is very tempting to rely on any standards without questioning their accuracy. In this study, and widely elsewhere, the ageing of foetal and neonate remains was based on measurements provided by Fazekas and Kósa in their 'bible' on foetal osteology (1978). However, as Scheuer and Black (2000) point out, the work of Fazekas and Kósa was not based on documented age, as might be expected; foetuses were largely aged according to crown-heel length.

In addition, individual variation is often not taken into account. For example, one of the individuals from Schela Cladovei, a young female whose age has been assessed at about 16 years, gives a very clear insight into the variation in epiphyseal fusion that can occur within a single skeleton. Variation between individuals can often vary considerably, especially if poor health or nutrition has delayed skeletal maturation.

Previously established methods are constantly being called into question; Mays and Cox, in their summary of methods of sex determination (2000), report that traditionally accepted pelvic sexual indicators such as the presence or absence of a preauricular sulcus and the width of the angle of the greater sciatic notch are more directly related to the morphology of the pelvis than sex. However, the authors do go on to say that the reliability of the pelvis as a sexual indicator is good, although the degree of accuracy is relative to the degree of sexual dimorphism in the population. The degree of dimorphism can also affect the accuracy of sexing using the skull. Although the Schela Cladovei females were extremely robust, the males were even more so and there was a strong degree of dimorphism between the sexes. It is considered, therefore, that assessment of sex in this population was reasonably accurate. In the case of the Tomb N remains, however, sexual dimorphism was not quite so evident, and this, together with the high degree of fragmentation of the remains, especially of the pelvis, must call into question the conclusions on sex in this population. Mays and Cox (2000) report studies that found 85% accuracy with sexing based on the dimensions of the femoral head. The Hili material has been sexed largely using this measurement, although many femoral head measurements taken from the Hili remains were found to be intermediate between the modern ranges for males and females. The inherent inaccuracies of osteological methods mean that any results must be treated as questionable. However, this is an issue that applies to all osteological analyses based on the more traditionally used macroscopic techniques.

The Diagnosis of Diseases from Skeletal Remains

The non-specific nature of some pathological lesions can prevent specific diagnoses from being made. Skull and orbital changes, similar to those found in the Tomb N group and thought in this case most likely to be the result of iron deficiency anaemia, also occur in the genetic anaemias such as thalassaemia and sickle cell anaemia, and scurvy and rickets. *Ante mortem* tooth loss can also be considered in this category. The reason for the widespread tooth loss during life, which can be the result of any one of, or a combination, of several causes, among the Tomb N inhabitants could not be ascertained.

Observer Inexperience

The lack of previous experience in dealing with a large assemblage of fragmentary and commingled remains meant that methods were only gradually developed. This resulted in lost time due to the need to re-examination of some of the material, and a slight lack of consistency in the recording of the data. It is hoped, however, that this initial inexperience has not had a seriously detrimental effect on the outcome of this study.

Genetic Contribution

Some variations in stature between contemporary neighbouring groups in both geographical locations cannot be adequately explained by dietary factors alone. It is assumed, therefore, that variations in average height, particularly marked between the Tomb N group and that of the nearby Tomb A group, must at least be partly related to diverse genetic origins. The inability to accurately assess the contribution made by genetics means that the reasons for these differences cannot be fully ascertained.

Thus, given that any population profile based on the macroscopic analysis of skeletal remains cannot hope to be all encompassing, particularly if the remains are in poor condition, what can we say about the two populations and the connections between their respective health status and diet?

Summary of the Skeletal Analysis: Schela Cladovei

At least 74 articulated skeletons were present among the examined Schela Cladovei remains. The excellent condition of the remains meant that an optimum of demographic information could be extracted. However, numerous factors indicate that the number of examined skeletons represented only a fraction of the population. Few children were present and it is not clear whether this is due to low infant mortality or an under-representation of immature remains. However, on the basis of the information available, it would appear that infant and child mortality was low. Despite the fact that about one third of the adults could not be accurately aged, it is apparent that many individuals lived into old age. It is speculated that the few early adult deaths were related to childbirth in females and violent activities in males.

Average stature indicated that this was a tall population. Male average height was 179.78 cm with a range from 172.25 cm to 188.49 cm. Average height for females was 165.31 cm and the range was 154.00 cm to 172.31 cm. It appears that mean stature in Eastern European Mesolithic populations was much greater than that of Western Europe, and, although the differences between various groups in the Iron Gates region were not marked, both males and females from Schela Cladovei were taller than their neighbours.

Dental health was good; this appears to be normal for Mesolithic populations. Very few individuals had lost teeth during life and those dental diseases that were present seemed to be related to old age.

Very few indicators of skeletal stress were noted. Only two individuals had hypoplastic lesions. One child, a foetus or neonate, had skull lesions similar to porotic hyperostosis and cribra orbitalia (although at this age such changes are unlikely to be associated with diet). Some bones were radiographed in order to identify the presence of Harris' lines, but none were noted. Most of the diseases identified, such as arthritis or trauma, were related to ageing, or heavy occupation or an active lifestyle. The number of individuals with fatal injuries caused by projectiles and the frequency of other traumatic injuries such as skull and possible 'parry' fractures indicated a high level of interpersonal violence. It is not clear if this occurred within or between groups.

The impression gained is of a tall, robust, healthy population, who, although displaying a high frequency of palaeopathological lesions, mainly suffered from those diseases associated with longevity, were well nourished from the exploitation of the ample food recourses available, and relatively free from disease. As stated by Robb (2000, 478) "the palaeopathological record, derived from a death sample, cannot be read as a straightforward record of health in a living population. As a result of this, healthier populations may appear in worse health skeletally because they survive longer to suffer mild chronic skeletal pathologies".

Summary of the Skeletal Analysis: *Tomb N, Hili Gardens.*

The Tomb N group was much larger than that of Schela Cladovei, and so is more likely to be representative of the population as a whole. Establishing the minimum number of individuals present was problematic in view of the fragmentation and commingling of the remains. The highest bone count gave a minimum number of 407 individuals, but there was great disparity, depending on which bone used. When data on age were taken into account, a minimum number of 447 is reached. The high proportion of unidentified remains suggests that this may well be an underestimate.

Age assessments were made for 411 individuals. A high proportion were immature (43%) and 58% of children had died before the age of 5 years. Assessment of adult age was disappointing; only 13%, out of a total of 236 adults, could be placed in the young adult, middle aged, or old adult category. Most that could be said of the others was that they had reached adulthood, so the extent of adult longevity could not be explored. However, there was little evidence of skeletal degeneration, which may indicate a young age at death.

Sex was assessed, albeit tentatively, largely on the basis of less reliable skeletal areas, for 144 of the 236 adults identified in the assessment of age at death. Females and probable females accounted for 44% of the total; males and probable males for 40%. Sixteen per cent of the total were sexually undiagnostic, i.e., their dimensions fell between the ranges for modern males and females.

Stature calculations for 46 adults, albeit on the basis of less reliable metatarsal lengths and with the sex of the individuals unknown, indicated an average female height of 157.65 cm, with a range of 147.80 cm to 163.48 cm, and an average of 171.07 cm, with a range of 164.62 cm to 183.42 cm for males.

These average heights are very similar to other contemporaneous populations in the Arabian Peninsula (suggesting the methods used may not have had too detrimental an effect on the results,) with the apparent exception of that of the neighbouring Tomb A at Hili North, where average height was much greater at 172 cm for females and 178 cm for males, approximately 15 cm greater for both males and females. The Hili population was fairly small although small stature does not necessarily indicate poor health, and, as the Tomb A population also appeared to suffer from the same diseases as the Hili population, the disparity in average height may be genetically related.

A relatively high level of disease was noted. Several individuals, the actual number difficult to assess, suffered from some form of metabolic disease, indicated by porotic hyperostosis and cribra orbitalia. Whether this was due to a nutritional disease such as scurvy or rickets is unlikely due to the lack of supporting evidence from post-cranial lesions, normally affected in these diseases. It is probable that these bony changes were due to one of the anaemias. However, again in view of the absence other characteristic post-cranial lesions, it is unlikely that one of the genetic anaemias was the cause. It has been concluded therefore the iron deficiency was the main contributing factor in the Tomb N group. According to Stuart-Macadam (1991), however, the presence of porotic hyperostosis may be indicative of a natural protective response to pathogens, more common in tropical and sub-tropical regions, and may not necessarily be indicative of poor health.

Dental health was extremely poor; sixty-four per cent of the adult jaw fragments had teeth missing *ante mortem*, similar to some other populations in the area, where it has been interpreted as being related to caries as a result of eating dates. The poor survival of teeth that had been *in situ* at the time of death and the widespread tooth loss during life meant that the evidence for caries in the Tomb N population was low. Tooth loss was often accompanied by a high frequency of periodontal disease and dental abscesses, both of which can ultimately result in tooth loss. Unfortunately, the main cause of this loss in the Hili population cannot be established, but the accompanying presence of a high level of dental abscesses and periodontal disease, indicates that it may have been multifactorial in origin.

Hypoplastic lesions were noted on 31 loose teeth, about 10% of those available for examination. More than half were from immature individuals. Dental hypoplasia has been linked with decreases in longevity (Goodman, 1991), and as about half of the affected individuals did not survive into adulthood, the presence of these stress markers do appear to be reflective of the poor health of at least some members of the population. A direct link with poor nutrition, however, cannot be established, as hypoplasia may also relate to periods of illness during childhood.

The impression gained from the analysis of the Tomb N group is of a population of fairly small stature, with some evidence for stress. This is clear from the high rate of child mortality, indications of young adult age at death, a fairly high frequency of hypoplasia, evidence for widespread anaemia, and very poor dental health. The highest mortality rate was in children between the ages of three months and 4 years. High mortality in this age group is normally taken as a key indicator of poor nutrition in under-developed countries today. However, poor nutrition and disease are often inextricably interlinked and it is not possible to relate the findings from Tomb N to poor nutrition alone, although it is very likely to have played a part.

Comparison of the two populations

While the main aim of this study is not to directly compare the two populations examined, especially since they are so different in terms of chronology, ecology, geography, environment, and genetic pool, it may be worthwhile to compare them here for the purposes of highlighting the point at issue, i.e., what relationships can be established between health and diet in skeletal populations.

It is accepted that mortality, adult stature and palaeopathological lesions can provide an insight into general health status, and by implication, the adequacy of the diet of a population. Osteological analysis appears to show the following differences between the two populations.

Age at death

There is an apparently higher mortality rate at Tomb N than at Schela Cladovei. However, it is likely that the Tomb N population was more representative of the population as a whole than Schela Cladovei. While lack of published data makes it difficult to compare Tomb N with other contemporaneous sites in the Gulf, Bondioli *et al.* (1998) also reported a high number of immature remains from the nearby site of Tomb A Hili North, and as the age-at-death distribution at Tomb N is similar to the mortality patterns of pre-industrial populations with high fertility (Wood *et al.*, 1992), it is reasonable to assume that the mortality at Tomb N was accurately represented. Very few immature remains were found among the Schela Cladovei remains. This could be due to various reasons: infant mortality rate was indeed low, not all of the buried population has been located, or the remains of children were treated differently from the adults at Schela Cladovei.

While, a large proportion of the Tomb N adults could not be accurately aged, there was little of the evidence for the skeletal degeneration apparent in the Schela Cladovei group. It does appear therefore that adults lived to a greater age at Schela Cladovei than at Hili.

Cohen and Armelagos (1984) took the view that great differences between the mortality rates of sedentary and nomadic populations may be expected as a result of a reduced mean age at death with the adoption of agriculture. This position, however, has been countered by Wood *et al.* (1992) who gave the example of the !Kung Bushmen where infant mortality improved once the community became settled.

Although there are a number of unknown factors which diminish the value of any direct comparison, there does appear to be a marked difference between the mortality rates of the two populations, and, while it must be concluded that the infant mortality rate in the Schela Cladovei group may be higher than indicated, it does seem that the adults at Schela Cladovei enjoyed greater longevity than those of Tomb N.

Stature

There were marked differenced between the average heights of the two populations. That of the Tomb N population was 157.65 cm for females and 171.07 cm for males, while at Schela Cladovei mean heights for females and males were 165.31 cm and 179.78 cm, respectively – a difference of approximately 8 cm between the females and almost 9 cm between the males. Although, the method used for assessing the heights of the Tomb N individuals had a greater margin of error, the fact that the average stature of both groups was similar to other contemporaneous populations in their respective geographical areas, helps to validate the findings.

The height of an individual is determined by both genetic and environmental factors, and while the relative contribution of genetics is difficult to assess, environment, including diet, is considered to be the more important (Tanner, 1989). It is likely, therefore that the greater height of the Schela Cladovei group is strongly related to their healthier lifestyle and adequate food resources.

General health

While a relatively larger number of pathological lesions were noted on the Schela Cladovei population, the majority were those normally associated with advanced age, active lifestyle, or heavy occupation. Arthritis was common, as were traumatic lesions, and several individuals had met a violent death. In contrast, there was little evidence of those diseases normally associated with poor diet; only one possible case of metabolic disease was identified and two cases of hypoplasia. Dental health was exceptionally good; most individuals still had a full set of teeth when they died. Although some lesions were noted on the dentition, in most cases these were associated with old age, i.e., periodontal disease, or abscesses or caries related to advanced attrition

The identification of pathological lesions in the Tomb N population has probably been severely restricted by the nature of the remains, and it was not possible to assess the health of any single individual. In spite of these limitations, it is clear that several diseases were prevalent. The most widespread was dental disease. A high proportion of the population suffered from extremely poor dental health. The evidence for this took the form of tooth loss associated with caries, dental abscesses and/or periodontal disease and, while the cause of the extensive tooth loss cannot be clearly established, regardless of the cause, most individuals must have suffered from a continuingly high level of pain and poor general heath as a result. The other most commonly occurring conditions were anaemia and dental hypoplasia, both or which have been associated with periods of malnutrition or disease during childhood.

Summary

The skeletal analysis of the populations studied indicates great differences between the two. The confirmed differences are as follows:

1. Dental health was poorer at Tomb N than at Schela Cladovei.
2. The Tomb N population was considerably smaller in stature, less sexually dimorphic and less robust than the Romanian group.
3. Dental hypoplasia was more common at Tomb N than at Schela Cladovei.

4. A number of individuals from Tomb N suffered from a type of anaemia; no examples of this were noted at Schela Cladovei.

A less securely established, but another possible difference is the greater longevity enjoyed the Schela Cladovei adults.

Connections between health and diet

Taking all of these factors into account it does appear that the Schela Cladovei population was healthy, and healthier than the Tomb N population. This is no doubt due, at least in part, to an adequate diet. Other direct or indirect causes which must be taken into account, however, are other environmental factors such as climate, living conditions, population size, and genetics, although the relative contributions of these are impossible to establish. Directly relating positive signs of health to diet is more difficult than in the case of negative ones such as in the nutritional deficiency diseases. Any conclusions can therefore only be general, but it does appear that in the Schela Cladovei population a connection between health and diet can been established, if only by implication.

Smaller stature, higher mortality and a higher incidence of disease does indicate that the Tomb N population is less healthy. However, there are a number of factors which precludes a direct link between this apparent poor health and diet being made: small stature does not necessarily equate with poor health; higher mortality could be due to higher levels of disease, although resistance to disease does appear to be inextricably linked with dietary sufficiency; it has not been possible to relate the high levels of *ante mortem* tooth loss to caries and hence to diet; and the presence of some form of anaemia could be viewed as a positive, and therefore healthy, reaction to pathogens. However, the major limiting factor in linking the apparent poor health of the Tomb N inhabitants to diet is the fragmentary and commingled nature of the remains which prevented more accurate assessments of health in *individuals*, essential for assessing the health of a *population*. The connection between health and diet in this case, therefore, cannot be clearly established.

Future Work

A further 30 skeletons from the initial excavations at Schela Cladovei have been located in Bucharest. It is hoped that it will be possible to examine these in the near future. Excavations have recommenced at Schela Cladovei and it is anticipated that further skeletal remains will be recovered. The expectations are, therefore, that one of the major limiting factors in establishing connections between health and diet, the size of the population, will be improved upon.

Excavations of Tomb N, using precise methods aimed at obtaining the optimum of anthropological information, are on-going. It is hoped that the resulting information will help to confirm and build upon the knowledge already gained and present new information. The anthropological analysis is already providing more accurate information on age at death, stature and the assessment of age in individuals. Plans have been initiated with medical specialists in the UAE to undertake a major radiographic analysis of the remains, with a view to assessing the presence of osteoporosis. It is hoped that this exercise will commence next year.

One interesting factor to emerge from the comparison of the Tomb N remains with other contemporaneous sites in the Arabian Peninsula, is the apparently significant difference in height between the populations of Tomb N and the nearby Tomb A, Hili North. Although, the Tomb A material has been previously examined, the results have never been published in full. Permission has been obtained from the Department of Antiquities and Tourism in Al Ain to examine this material.

An area worthy of future research which became apparent during this study is the apparent dissimilarities between Mesolithic populations of Eastern and Western Europe, especially in stature.

Little can be done about some of the limiting factors inherent in any study aimed at establishing connections between health and diet in prehistoric populations.

Population size and composition, the nature of the human remains, the difficulties in diagnosing some pathological conditions will always constrain the efficacy of any such analysis. However, while there are major inaccuracies in current osteological methods, improvement will come over time as more research is carried out.

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Appendix 1

Skeletal Reports: Schela Cladovei

Year:	1965
M No:	No M no. Bones labelled SB Sq.2 1m
Bones present:	incomplete right clavicle fragmentary ribs few fragments scapula most of thoracic and lumbar spine and superior part of sacrum, fragmentary innominates, pubic areas missing pair humeri, heads missing pair radii, left head missing pair ulnae, almost complete incomplete pair femora both hands, some bones missing
Age:	adult (epiphyseal fusion, slight spinal degeneration)
Sex:	male (narrow sciatic notch, morphology sacrum; epicondylar width of humerus; diameter head and bicondylar width of femur)
Stature:	181.75 cm (radius)
Pathology:	1) deep pitting site of attachment for costoclavicular ligament of right clavicle 2) Deep depression with pitting centre sternal articulation of right clavicle 3) Moderate lipping around 6 tubercles of ribs 4)Slight osteophytosis around LV4 and LV5
Comment:	slight traces of blackening or reddening by fire on some vertebrae
Additional bones:	inferior sacrum (spina bifida – sacral crest open to above junction with S2/S3) cuboid 1st metatarsal (epiphysis unfused) 5th metatarsal (epiphysis unfused) shaft phalanx (epiphysis unfused) fragment phalanx (epiphysis fusing)
Year:	1967

M No:	M1 bis (schelet copil) (check this with Diana)
Bones present:	fragmentary ribs vertebrae from 2 individuals pair innominates (fragmentary) + fragments from another individual distal ½ left humerus pair ulnae, proximal ½ right missing complete left & distal _ right femora + additional right distal _ complete right patella pair tibiae (distal end right only) + additional fragments right and left distal ½ right fibula (epiphysis fused) + proximal ½ left (epiphysis fusing) 3 middle phalanges hand right calcaneus & talus two metatarsals (possibly from different individuals) middle phalanx foot
Age:	Individual 1. 16-23 years (epiphyses on vertebral bodies, iliac crest, proximal fibula fusing) Individual 2. adult (epiphyses on vertebral bodies fused)
Sex:	Individual 1. female (wide sciatic notches) Individual 2. female (wide sciatic notch)
Stature:	1. 167.50 cm (ulna) 2. 172.31 (tibia)
Pathology:	1) lower TV (11^{th}?) with an embedded arrowhead in the superior part of the body. Part of the surrounding bone has fractured and broken away. The inferior part of the anterior aspect of the upper vertebra has been damaged, probably during the entry of the missile. Entry was from front left in a downward direction. Part of the arrowhead has been sheared off, suggesting some attempt at removal? There is no evidence of healing and it is likely that this would have been the cause of death. 2) Part of a body of lumbar vertebra with a bone point embedded, in the right side of the body. The point had entered from a right side/front downward direction. It is not clear whether the entry of the point has caused the vertebra to shatter or whether the damage is post mortem. There is no evidence of bony growth to indicate healing. The bone point had broken off but would have entered the spinal column.

Comments: 1) Mixed remains from at least two individuals
2) Traces of red ochre on a fragment sacrum, right innominate & right calcaneus

Year:	1967
M No:	M1
Bones present:	complete left clavicle fragmentary ribs pair incomplete scapulae almost complete spinal column pair complete innominates pair complete humeri pair complete radii pair complete ulnae pair complete femora right patella pair complete tibiae pair fibulae, both distal ends missing both hands, incomplete foot, incomplete
Age:	young adult (full epiphyseal fusion; no spinal degeneration, slight ossification of sternal cartilages of ribs, pubic symphysis – Gilbert & McKern's component 2-3)
Sex:	female (pelvic and sacral morphology, epicondylar width humeri)
Stature:	161.11 cm (combined humeral, femoral & tibial lengths);
Pathology:	indentations & pitting at area for attachment for adductor longus
Comments:	1) red ochre on posterior sacrum & lateral & posterior parts both innominates 2) calcium carbonate concretion has fused several vertebrae together & scaphoid and lunate to left radius 3) dimensions of scapulae, clavicle, heads humeri, femora sexually undiagnostic
Additional bones:	Fragment tibial condyle

Year: 1967

M No: Complex Epi – 1m Oase Umaine 1

Bones present:
fragment cranium
2 fragments mandible
pair clavicles, complete
body of sternum
11 fragments ribs
vertebral remains from at least 2 individuals
3 fragments innominate
proximal ½ right radius
proximal ½ right ulna
3 small fragments femur
right patella
2 fragments tibia
2 fragments fibula
hand bones from at least 2 individuals
foot bones from at least 2 individuals

Age: Individual 1) under 20 (epiphyses of clavicles, ribs and vertebrae unfused)
Individual 2) middle-aged adult (full epiphyseal fusion, spinal degeneration, pubic symphyseal morphology Todd's Phase VII – age 35-39)

Sex: Individual 1) Male (length clavicles, clavicles & ribs extremely robust)
Individual 2) ?

Stature: 175.36 cm, 178.08 cm (length of two 3rd metatarsals – may not be a pair)

Pathology:
1) Individual 1 - bone point embedded in body of a thoracic vertebra, point of entry from front left
2) Individual 2 - moderate lipping around body and facets of thoracic & lumbar vertebrae
3) Individual ? - 3rd metacarpal with lipping at proximal end & twisted shaft
4) Individual ? - moderate lipping around facets for calcaneus and tibia of left talus.
5) Individual ? - slight lipping around tibial facet of right talus (not a match for left)
6) Individual ? - slight lipping around all articular facets of left 1st cuneiform
7) Individual ? - slight lipping around most articular facets of left cuboid

8) Individual ? – lipping around proximal end and erosive lesion on lateral surface of shaft of left 3rd metatarsal

Comment: 1) fragment cranium, both fragments mandible, some fragments vertebrae, 2 fragments pelvis, fragments femora, tibia, and some hands and foot bones burnt black.

Additional Bones: (all immature)

3 cranial fragments
pubis (from child c. 3 years)
radius (from a child c. 3 years?)
phalanx
body vertebra
unfused head femur

Year:	1968
M No:	M2
Bones present:	6 fragments cranium fragment maxilla right mandible (teeth in situ but damaged) 10 fragments ribs CV, 2 fragments TV pair innominates (fragmentary) distal end right humerus fragment head radius 2 fragments right ulna fragment femoral condyle fragment tibial condyle fragment fibula 5 metacarpals + 3 phalanges duplicated left calcaneus & right 1st cuneiform fragments 3 metatarsals proximal phalanx foot
Age:	older adult (slight lipping of body of CV, auricular surfaces of innominates, capitulum of right humerus, left pubic symphysis suggests Todd's Phase IX or X – 45-50 or 50+)
Sex:	male (pelvic morphology, epicondylar width, general robusticity)
Stature:	unknown
Pathology:	1) slight lipping around inferior body CV (7?) 2) hyperostosis along iliac crest, greater tuberosity, inferior edge ischio-pubic ramus, pectineal lines and lipping around auricular surfaces of innominates. 3) lipping around facet for cuboid of left calcaneus
Comment:	most bones are burnt
Additional bones:	2 fragments innominate

Year:	1968
M No:	M3
Bones present:	fragmentary skull complete mandible complete dentition complete atlas complete axis
Age:	adult (M3s erupted, sagittal & coronal sutures starting to fuse)
Sex:	? (brow ridges heavy, nuchal line pronounced, mastoid processes not pronounced)
Stature:	unknown
Pathology:	none
Comment:	1) skull, atlas and axis, separated from the rest of the skeleton and deposited while still in articulation? 2) numerous sutural bones in lambdoid suture 3) alveolar resorption approx. 3 mm but no evidence of infection 4) calculus present on all teeth
Additional bones:	none

Year: 1968

M No: 3a

Bones present: almost complete skull (part left cheek area missing)
basilar part occipital (detached)
left ½ mandible (all teeth in situ)

Age: adult (M3 erupted, sutures starting to obliterate)

Sex: ? (brow ridges heavy, nuchal line pronounced, mastoid processes not pronounced)

Stature: not known

Pathology: 1) raised linear lesion down centre of frontal and along part of sagittal suture & circular 'dent', 13 mm in diameter, 1-2 mm deep towards posterior of right parietal.

Comment: 1) numerous carps' teeth accompanied the bones
2) cranial measurements indicate a high and narrow or long head

Additional bones: none

Year: 1968

M No: ? (schelet ous la vatra) get Romanian checked & translated

Bones present: fragments cranium from 2 individuals (duplicated frontal & temporal bones)
right maxilla with all teeth in situ at death (central incisor lost pm)
2 small fragments vertebrae

Age: adult (M3 erupted)

Sex: Individual 1) male (very pronounced brow ridges, large mastoid processes)
Individual 2) ? (small brow ridges – may be female)

Stature: unknown

Pathology: none

Comment: 1) all bones burnt
2) unclear whether maxilla belongs with either of the crania

Additional bones: none

Year:	1968
M No:	Largirea 1
Bones present:	cranium, face fragmentary ribs right scapula few vertebral fragments
Age:	adult (spinal degeneration, epiphyseal fusion, partial obliteration of cranial sutures)
Sex:	male (cranial morphology, scapular dimensions)
Stature:	unknown
Pathology:	1) lipping at tubercles of ribs 2) arthritic change at shoulder and acromioclavicular joint of scapula 3) moderate to severe spinal degeneration
Comment:	none
Additional bones:	none

Year:	1968
M No:	Largirea 1,55
Bones present:	cranium detached maxilla mandible atlas axis
Age:	45+
Sex:	male (skull morphology)
Stature:	**?**
Pathology:	1) perimortem skull trauma 2) healed frontal fracture 3) pitting external cranial surface 3) periodontal disease/ dental abscesses 5) healed fracture left mandibular ramus 6) secondary arthritis of left temporomandibular joint
Comment:	1) cut marks associated with perimortem skull trauma 2) widespread severe attrition present
Additional bones:	none

Year:	1982
M No:	M1
Bones present:	skull mandible full dentition hyoid fragmentary ribs pair clavicles pair scapulae almost complete spine pair innominates pair humeri pair radii pair ulnae pair femora left femur left patella pair tibiae left tibia left fibula
Age:	1) older adult (maxillar suture closure - +50, arthritis shoulders, elbows, severe spinal degeneration, fusion of greater horns of hyoid to body) 2) adult (epiphyses fused)
Sex:	1) male (marked brow ridges, nuchal crest & mastoid processes, dimensions of glenoid cavity, head & epicondylar width humerus, head & bicondylar width femur) 2) male (dimensions femur)
Stature:	1) 179.21 (length femur) 2) 184.13 cm (combined lengths femur & tibia)
Pathology:	1) lipping around both glenoid cavities, more marked on right 2) severe lipping around most vertebral bodies 3) lipping, pitting and eburnation of many vertebral facets 4) marked porosity with bone destruction of all vertebrae and both innominates 5) arthritis both elbows, more marked on right 6) arthritis right wrist 7) Pitting of the alveolar process indicates the presence of periodontal disease.
Comment:	1) narrow or long and high headed 2) all teeth present at death

3) upper anterior teeth worn down to roots

Additional bones: head humerus
left innominate
left femur (male, height 178 cm)

Year:	1982
M No:	M3
Bones present:	15 fragments ribs lower TV 2 LVs sacrum right innominate distal 1/3 right humerus pair femora right patella pair tibia pair fibula both feet, incomplete
Age:	adult (full epiphyseal fusion, pubic symphysis – Gilbert & McKern's Stage 0-2)
Sex:	female (morphology of innominate & sacrum, epicondylar width humerus – diameter head and bicondylar width of femur within the norm for modern males)
Stature:	159.09 ±3.55 (combined lengths femur & tibia)
Pathology:	1) the sacral cornu of SIV & SV are well apart – spina bifida? 2) deep and pitted attachment for adductor longus on right pubis 3) osteophytic growth on bodies of vertebrae 4) lipping around right acetabulum 5) lipping around both heads femur 6) 2 sinuses on lower shaft right tibia with generalised thickening 7) lipping, pitting and eburnation on articular surface of lateral malleolus of left fibula 8) slight lipping around articular surface of right cuboid, right navicular, 2nd & 3rd left cuneiforms & heads of both 1st metatarsals (small area of eburnation on left head)
Comment:	1) diameter head and bicondylar width of femur within the norm for modern males, although very short (stature 160 cm) 2) red staining on both surfaces of ilium may be red ochre
Additional bones:	TV (epiphyseal ring fusing) left innominate (male?)

Year: 1982

M No: M5

Bones present:
frontal
right temporal
right malar
part both parietals
sternum
13 fragments ribs
2 lumbar vertebrae
sacrum
pair innominates
distal½ right humerus
pair radii
pair ulnae
pair femora
proximal _ right tibia
proximal ¾ right fibula
few hand bones

Age: older adult (epiphyseal fusion, xiphoid process sternum fused, marked degeneration, spine, right elbow, left hip, both knees, right wrist, state pubic symphysis – Todd's phase VII, age 39-44)

Sex: male (prominent brow ridges, large mastoid process, pelvic morphology, dimensions of humerus, femora)

Stature: 180.53 cm ±3.94 (length right femur)

Pathology:
1) linear depression and pit above right orbit with slight deviation of the orbital edge, continuing vertically down right malar, associated with erosive lesions and reactive growth on external and internal surfaces of frontal, temporal and parietals – probable healed skull fracture.
2) gross osteophytic growth, pitting & erosion of bodies & facets of 2 lumbar vertebrae
3) lipping & eburnation right elbow
4) lipping pitting both hips
5) lipping both knees, more marked on right
6) lipping eburnation right wrist

Comment: none

Additional bones: immature right tibia (65 mm long, aged neonate to 6 months?)

Year:	1983
M No:	M6
Bones present:	fragments cranium pair clavicles incomplete spine 6 fragments ribs pair humeri right radius pair ulnae pair femora left patella shaft tibia shaft fibula proximal phalanx hand
Age:	adult (epiphyseal fusion)
Sex:	female (small mastoid process, length clavicle)
Stature:	155.97 cm ±4.30 (length ulna)
Pathology:	none
Comment:	2 fragments of quartz
Additional bones:	none

Year: 1983

M No: M12

Bones present: cranium
mandible
lower dentition (6 anterior teeth missing pm)
right clavicle
spinal column from C3 to T2
2 fragments LV
proximal phalanx hand

Age: adult (M3s erupted, moderate attrition, cranial sutures obliterating)

Sex: ?

Stature: not known

Pathology: none

Comment: unretouched fragment flint

Additional bones: 2 fragments cranium (immature?)

Year: 1983

M No: SVI, 10a-11a, 0.85

Bones present: 7 fragments ribs
2 fragments vertebrae
inferior part sacrum
fragment clavicle
2 hand bones
left foot, incomplete

Age: adult (vertebral epiphyses fused)

Sex: ?

Stature: ?

Pathology: none

Comment: 1) red ochre staining on calcaneus
2) unclear whether the above bones all belong to the same individual

Additional bones: immature ilium (neonate?)
immature right femur (neonate?)
immature fibula (neonate)
immature left femur (7-8 month foetus?)

Year: 1983

M No: SVI, Sq 12, 0.90

Bones present: fragment cranium
fragment malar
fragment ramus mandible
left clavicle
6 fragments ribs
TV
4 hand bones
2^{nd} metatarsal

Age: young adult (sternal epiphysis clavicle almost fully fused)

Sex: male? (based on stature)

Stature: 179.63 ± 6.76 cm (length 2^{nd} metatarsal)

Pathology: lipping around both ends 2^{nd} metatarsal

Comment: none

Additional bones: none

Year: 1983

M No: SVI, Sq 11, 0.65

Bones present:
9 fragments cranium
fragment left orbit
left/central mandible
fragment both scapulae
fragment right clavicle + fragment
2 fragments vertebra
5 fragments ribs
pair radii, both incomplete
pair ulnae, proximal ends missing
4 fragments humerus
4 fragments femur
left patella
fragment shaft tibia
3 fragments shaft fibula
both hands, incomplete
right 4th metatarsal

Age: adult (moderate attrition, epiphyseal fusion)

Sex: female (length glenoid cavity scapula)

Stature: ?

Pathology: moderate calculus

Comment: piece quartz

Additional bones:
fragment immature cranium
fragment ramus mandible
distal 1/3 right ulna
left patella

Year:	1983
M No:	SVI, Sq 10a, 0.45
Bones present:	2 fragments mandible alveolar part missing) 9 fragments vertebra 2 fragments scapula fragment shaft of clavicle 27 fragments ribs pair distal ends humeri pair radii pair ulnae head femur 4 hand bones proximal 2/3 right metatarsal
Age:	adult (epiphyseal fusion)
Sex:	female (epicondylar width, diameter head femur, gracile bones)
Stature:	154.00 cm ±4.24 (length radius)
Pathology:	1) pitting, lipping & eburnation on vertebral facets 2) slight pitting in the centre of heads of both radii
Comment:	septal apertures both humeri
Additional bones:	shaft humerus immature ulna (child c. 6 or 7)

Year	1983
No:	SVI, Sq 10, 0.55
Bones present:	5 fragments cranium right mandible fragment scapula fragment radius fragment humerus 2 fragments innominate
Age:	older adult (advanced attrition, alveolar resorption 5 mm)
Sex:	?
Stature:	?
Pathology:	small carious lesion occlusal surface M2
Comment:	unclear whether all fragments are from the same individual
Additional bones:	none

Year:	1984
M No:	M16
Bones present:	skull right mandible part rib cage left radius left ulna right innominate distal 1/3 left femur both feet, incomplete
Age:	c. 18 years (distal epiphysis radius fusing, iliac crest unfused, no ossification of costal cartilage, line of fusion of distal epiphysis of femur still visible)
Sex:	female (skull rounded, mastoid processes & nuchal crest small, sciatic notch appears wide, preauricular sulcus present, although bicondylar width is within range for modern men)
Stature:	167.74 ±4.24 (length radius)
Pathology:	1) hypoplastic pits on lower right canine & 1st premolar, occurring c.5 years 2) area of pitting and reactive growth on lateral condyle of femur, 3 pits on medial condyle – no lipping around articular surface
Comment:	1) piece red ochre 2) piece shell
Additional bones:	shaft fibula

Year:	1984
M No:	M17
Bones present:	skull, superior part missing maxilla mandible partly complete spine sternum both scapulae, in fragments pair clavicles full rib cage, in fragments pair humeri pair radii pair ulnae both hands pair innominates right femur pair patellae pair tibiae 2 fragments fibula 5 foot bones
Age:	young adult c. 21 (unfused cranial sutures, slight dental attrition, epiphyses on thoracic vertebral bodies fusing & those on lumbar vertebrae just fused, sternal epiphyses of clavicles 2/3 fused, epiphysis on pubic tubercle appears to have just fused, all other epiphyses fused)
Sex:	male (long mastoid processes, length glenoid cavities, diameter head & epicondylar width humerus, narrow sciatic notch, short pubis, diameter head & bicondylar width femur)
Stature:	172.25 ±3.94 (length femur)
Pathology:	1) hypoplasia, occurring c. 1 year of age 2) large contact caries lower left M1
Comment:	none
Additional bones:	lunate phalanges hand 2^{nd} metatarsal

Year:	1984
M No:	M18
Bones present:	body sternum ribs lower thoracic, lumbar & sacral spine pair innominates inferior parts both humeri pair radii pair ulnae pair femurs, incomplete left patella pair tibiae right & part of left fibula both hands, incomplete both feet, incomplete
Age:	older adult (full epiphyseal fusion, right pubic symphysis smooth – Todd's Phase IX, age 45-50)
Sex:	male (sacral & pelvic morphology)
Stature:	178.24 ±4.00 (length tibia)
Pathology:	1) healed fractures with slight deviation, callous formation and lipping near angle on 6 right ribs. 2) deep depression (Schmorl's node?) on superior body surface of L5 with extensive osteophytic growth on anterior surface of body, curving up over superior edge and L4. There appears to have been slight anterior displacement. 3) moderate lipping around proximal end right ulna. 4) raised (6 mm proud of bone surface) and pitted lesions at medial-anterior surface on both femora, at the area of attachment for the iliofemoral ligament and the gluteus maximus. Fovea capitae are very deep and pitted and articular surface of both heads extend laterally into the neck area by 25 mm; part of these areas are pitted. 5) marked osteophytic formation on anterior surface of left patella, at site for attachment of rectus femoris. 6) slight lipping on the left tibia at the facet for the fibula. 7) lipping around proximal articulations of both 1st metacarpals, more marked on the right. Nodule of bone on lateral side of right , just proximal to the head.
Comment:	none
Additional bones:	none

Year:	1984
M No:	M19
Bones present:	4 fragments rib shaft 11 poorly preserved vertebral fragments sacrum pair innominates lower end right humerus right radius right femur pair tibiae pair fibula right hand, almost complete both feet, incomplete
Age:	adult (full epiphyseal fusion, all segments of sacrum fused)
Sex:	female (sacral & pelvic morphology)
Stature:	165.06 ±3.66 (length tibia)
Pathology:	1) left 2nd to 5th metatarsals have healed transverse fractures – at approximately the distal 1/3 on the 2nd, mid-shaft on the 3rd, distal 1/3 on the 4th and just proximal to the head on the 5th. The fractures of the 2nd to 4th metatarsals are poorly aligned with loss of length (the left 4th was 4 mm shorter than the right). There was no mal-union or shortening of the 5th. 2) marked ossification at the ischial spine and around obturator foramen on left innominate and similar bony changes appear to be present on the fragmentary right – an indication of pressure on pelvic floor muscles during childbirth? 3) sacral canal is fully open (although superior-most part of the sacrum is missing) – spina bifida.
Comment:	none
Additional bones:	none

Year: 1984

M No: M23

Bones present:
skull
maxilla
mandible
spine
both scapulae
both clavicles
sternum
fragmentary ribs
pair humeri
pair radii
pair ulnae
pair innominates
pair femora
pair patellae
pair tibiae
pair fibulae
both feet

Age: young adult c. 25 (full epiphyseal fusion, slight attrition, fusion of the sternal epiphysis of clavicle 2/3 complete, slight degree of ossification of the costal cartilage, pubic symphysis Todd's Phase IV to VI - age 25-35)

Sex: male (pronounced nuchal line, dimensions of humerus & femur, morphology of pelvis)

Stature: 178.25 ±4.00 (length tibia)

Pathology: 1) spine of C3 markedly skewed to the right, right superior & left inferior facets are enlarged - suggesting scoliosis. No lipping or pitting present.
2) The costal facets on T1 are enlarged and surrounded by lipping. No obvious articular surface is visible.
3) the two inferior-most of 4 articulating thoracic vertebrae (within the range T3 to T9) showed slight bulging of the anterior-right body. No other obvious pathology.
4) The body of L1 has collapsed with displacement, wedging, loss of height on the anterior side and an 'overhang' of bone superiorly. There is some associated billowing of the body surface and also those of T12 and L2, although there is no lipping around the body edges apart from the previously mentioned 'overhang'. There is a marked loss of body height (5 mm) on the right side of L5 and reactive bone loss and irregular growth on the left superior surface of the body of L5.

(The inferior body surface and superior surface of sacrum is not visible). The loss of anterior height on L1 and left side height on L5 may have resulted in a marked scoliosis and kyphosis. It is not clear whether the lesions are traumatic in origin or the result of disease, although the damage to L1 could have been caused by a fracture.

5) enthesopathic lesions at both sites for the attachment of the costoclavicular ligaments. On the right is an area of pitting 19 mm long, and on the left there is a raised, smooth and pitted area 22 mm long, surrounded by a deep groove.

6) One fragment of rib shaft with an indentation on the external surface & slight bulging of the inferior edge may be the site of an undisplaced healed fracture.

7) small pit and a 'lump' of bone 4 mm in diameter and 2 mm deep in the inferior surface are situated immediately posterior to the tubercle of a right rib. The tubercle itself is pitted.

8) small irregular 'punched out' lesion on the distal articulation of a left radius. The distal articular end & the diameter of the shaft is about 2 mm greater on the left bone.

9) Slight lipping around coronoid process of left ulna. There is also an oval lesion, 8 x 4 mm and 2 mm deep, with edges, which are rounded, smooth and slightly pitted, on the posterior left shaft at approximately distal 1/3, and a linear, pitted lesion, 14 mm long on the lateral side of the trochlear notch.

10) Arthritic lipping is present around lateral and medial edges of the condyles of the left femur and around the intercondylar fossa, more marked on the lateral side. It is not clear (because of *post mortem* concretion) whether the patellar surface or the patella itself was affected. Apart from some very slight lipping around the intercondylar fossa, which may be pathological, the right femur is unaffected.

11) strange linear lesion with a pitted lump of bone at approximately the distal 1/3 of the right fibula, lateral to the interosseous border. The 'lump' is approximately 4 x 7 mm and 2 mm deep with a flatter but bumpy tail. The whole lesion is 22 mm long.

12) lipping was present around head of right 1st and 2nd and left 1st metacarpals. There were various lumps and pitting on the shafts and pitting on the proximal articular surfaces. There was pitting and lipping on the heads of both 5th metatarsals, and the proximal facet of the right 1st proximal phalanx was enlarged and lipped. Pitting and lipping was present on five of the ten other phalanges present.

Comment: bones from the right and left foot fused together by *post mortem* concretion

Additional bones: right 1st metacarpal lumbar vertebra

Year:	1984
M No:	M24
Bones present:	ribs inferior spine (T11 to sacrum) pair innominates (pubic areas missing) distal 2/3 right humerus right radius pair ulnae pair femora left patella pair tibiae pair fibulae few hand bones both feet, incomplete
Age:	adult (middle-aged?) (full epiphyseal fusion, all segments of sacrum fused, slight to moderate degree of ossification of costal cartilages, moderate degeneration of the lumbar spine)
Sex:	male (narrow sciatic notch, no preauricular sulcus, dimensions sacrum & femora)
Stature:	182.44 ±3.69 (combined lengths femur & tibia)
Pathology:	1) moderate lipping around body and facets L3/4, L4/5, L5/Sacrum + two large depressions surrounded by reactive growth on articular surface of 1st body sacrum – Schmorl's nodes?) 2) slight lipping around trochlea and capitulum right humerus 3) muscle attachments for gluteus maximus on both femora, which are very well marked with pitting & lipping, deviate medially, with deep lateral grooves and bowing lateral to the grooves, resulting in a very large mediolateral diameter. Bilateral lesions 28 x 17 mm on upper posterior necks appear pathological, although not associated with any muscle attachments. 4) distortion of the proximal end of right 1st metacarpal with 10 mm extension on medial side, graduating into shaft. Possible healed short oblique fracture across base with joint involvement (Such a fracture "is usually sustained from longitudinal violence, applied by a blow, as in boxing", Adams and Hamblen, 1992.) Thickening of the articular surface of the right triquetral may indicate secondary osteoarthritis of the carpo-metacarpal joint.

5) Left 3rd metatarsal with moderate lipping around head articulates with proximal phalanx, which has moderate lipping around the base.

Comment: none

Additional bones: none

Year:	1986
M No:	M29
Bones present:	skull mandible full dentition sternum complete rib cage pair clavicles pair scapulae complete spine pair innominates pair humeri pair radii pair ulnae pair femora left patella pair tibiae pair fibulae both hands both feet
Age:	adult – middle-aged? (full epiphyseal fusion, slight to moderate dental attrition, interpalatine & intermaxillary sutures still visible, pubic symphysis Todd's Phase VIII, IX – age 39 – 50, slight spinal osteophytosis)
Sex:	male (large mastoid processes, pronounced supraorbital ridges & nuchal crest, dimensions of sternum, sacrum, glenoid cavity, humerus & femora, short pubis, narrow sub-pubic angle, narrow sciatic notch, no auricular sulcus)
Stature:	173.47 ±3.69 (combined lengths femur & tibia)
Pathology:	1) healed fracture angle left 3rd rib 2) several ribs with lipping around tubercles 3) slight osteophytic formation around bodies and between superior facets of most vertebrae, and lipping around left superior facet atlas left superior facet L3 and around right costal facet of T10. Small Schmorl's nodes on body surfaces of T8 and T9. 4) lipping on anterio-superior edge of left auricular surface of sacrum and on the medial side, more marked at the medial corner, of the auricular surface of the left innominate. 5) moderate lipping around left femoral condyles & reactive growth on articular surfaces, around whole articular surface of

left patella and around the proximal articulation of the left tibia.
6) the whole articular area of right calcaneus is enlarged, flattened & lipped and the superior edge has a small area of eburnation. Slight lipping is present around the posterior, middle and anterior talal articular surfaces. Very slight lipping also appears to be present on the left. Moderate lipping around the right posterior cancaneal surface and slight lipping around the middle articular surface of the right talus. Slight lipping on right cuboid around articular surface for calcaneus and there is a large spicule of bone on inferior surface near base of articulation with 4th metatarsal. Spicule of bone on superior surface of left near articular surface with calcaneus. Lipping is present around the articular surfaces of one of the two right naviculars. The heads and bases of both 1st metatarsals are similarly affected.

Comment: the left innominate and left femur is redder in colour that the corresponding right bones.

Additional bones: fragment left rib
right navicular
5 metatarsals

Year: 1986

M No: M30

Bones present: skull

Age: adult (M3s erupted, moderate dental attrition, sutures obliterating)

Sex: male? (large mastoid process, brow ridges and nuchal crest pronounced, forehead sloping)

Stature: ?

Pathology: none

Comment: very prominent nose
moderate calculus (go back and mention calculus here)

Additional bones: none

Year:	1986
M No:	M31
Bones present:	part cranium (parietals & superior frontal)
Age:	adult? (sutures almost obliterated)
Sex:	?
Stature:	?
Pathology:	dent, 25 x 20 mm, surrounded by a raised edge on sutural edge – traumatic lesion?
Comment:	none
Additional bones:	none

Year:	1986
M No:	M33 (Individual 1)
Bones present:	fragmentary cranium full dentition fragmentary rib cage pair clavicles pair scapulae complete spine (apart from 1 TV) pair humeri pair radii pair ulnae pair innominates, fragmentary pair femora pair patella pair tibiae pair fibulae both hands, incomplete both feet, incomplete
Age:	50+ (advanced attrition, morphology pubic symphysis – Todd' Phase X)
Sex:	male (heavy supraorbital ridges, pronounced nuchal crest, large mastoid processes, dimensions clavicle, humerus and femur, narrow sciatic notch, short pubic bone)
Stature:	180.31 cm ±3.69 (combines lengths femur and tibia)
Pathology:	1) 4 left ribs with marked osteophytic formation overhanging tubercles – none on the right side 2) The superior left costal facet of an upper thoracic vertebra had moderate lipping around it. Schmorl's node present on superior body surface of upper thoracic vertebra. There may also be a small one present on the inferior surface. Mid thoracic vertebra with slight lipping around inferior surface. Mid thoracic vertebra with slight to moderate lipping on inferior body surface. Slight lipping around inferior edge of body of lower thoracic vertebra. Marked bone destruction and reactive growth of right superior facet of TV. Marked irregular growth and bone destruction on superior costal facets of TV. Enlargement and lipping of left inferior facet of TV. Fragment of lamina of TV with only right facets remaining. Both facets are lipped and pitted. Lower TV with slight lipping around both edges of body. Lower TV with moderate lipping around inferior edge of body. Slight lipping around inferior edge of LV - probably L2. Slight lipping around both body

surfaces of L3. Moderate lipping around superior edge of L4. Slight lipping around superior edge of L5.
3) healed fracture at the proximal 1/3 of shaft of left femur, with loss of height of about 5 cm. Reactive bone growth indicates that this was a compound fracture.
4) arthritis of both 1st metatarso-phalangeal joints, much more marked on the left. Slight lipping on 2nd metatarsals and on some phalanges.

Comment: none

Additional bones: none

Year:	1986
M No:	M33 (Individual 2)
Bones present:	fragmentary cranium 4 rib fragments pair humeri proximal ½ left femur
Age:	foetal/neonate (length humerus)
Sex:	?
Stature:	?
Pathology:	1) pitting on the external surface of all cranial fragments and marked erosive lesions on the internal surface. 2) abnormal growth visible on both orbits
Comment:	none
Additional bones:	none

Year:	1988
M No:	M37
Bones present:	skull upper dentition fragment sternum 13 fragments ribs pair scapulae, incomplete incomplete spine pair innominates, incomplete pair humeri, incomplete pair radii, damaged left ulna pair femora pair tibiae pair fibulae, incomplete 5 metacarpals, 6 phalanges both feet with toes missing
Age:	older adult (cranial sutures almost fully obliterated, advanced attrition (Brothwell's 45+), pubic symphysis – age over 50 (Gilbert & McKern's Stage 5),
Sex:	female (skull morphology, wide sciatic notches, no preauricular sulcus, long pubic bone, bicondylar width right femur)
Stature:	171.57 ±3.55 (length femur + tibia)
Pathology:	1) 2 fragments ribs with lipping around heads & tubercles 2) slight to moderate lipping around body edges of several vertebrae 3) pitting present in both acetabulums. The rims are missing so it is not clear if lipping was also present but there was slight lipping around the heads of both femora. 4) slight lipping of the left and moderate lipping of the right calcaneo-talal articulation. 5) healed fracture of the left 5th metatarsal, just proximal to the head
Comment:	1) length glenoid cavity within the range for modern males 2) diameter heads of humerus and femur sexually undiagnostic
Additional bones:	fragment cranium left 3rd metatarsal

Year:	1988
M No:	M38
Bones present:	fragmentary skull mandible full dentition almost complete spine fragmentary rib cage left scapula pair clavicles pair humeri pair radii pair ulnae both hands, almost complete pair innominates both femora, incomplete left patella pair tibiae right fibula both feet, incomplete
Age:	45+ (advanced dental attrition, severe spinal degeneration, morphology of the pubic symphysis – Todd's Phase X – 50+)
Sex:	female (small brow ridges, nuchal crest & mastoid processes, pointed chin, wide sciatic notch, deep preauricular sulcus)
Stature:	163.90 ± 3.66 cm (length tibia)
Pathology:	1) carious lesion on occlusal surface upper left M1, large abscess at the root. The crown of this tooth, and all other M1s, had been almost completely worn away by attrition, probably the cause of the caries & abscess. 2) lipping around facets atlas & axis, lipping around inferior body T5, T6, T7 & T8 fused together by gross osteophytic growth, T9-T11 all had marked lipping around bodies but were not fused (no lipping between T10 & T11), gross lipping around inferior body edge of L5. 3) several ribs had pitting and lipping of heads & tubercles. 4) slight lipping around head right humerus. 5) marked distortion of the head of the left 1st metacarpal with reactive growth around the head. Marked lipping around head left 2nd metacarpal. 6) lipping around facet for tibia on both tali
Comment:	1) dimensions scapula within norm for modern males, those of humerus & femur are sexually indeterminate.

2) three fragments shell

Additional bones: 4^{th} metacarpal
immature fragments cranium, ribs, left humerus, right tibia, 3 fragments longbones & 1^{st} metacarpal/metatarsal (foetus/neonate)

Year:	1989
M No:	M39 (Individual 1)
Bones present:	skull mandible spine (from C6 to L5) fragmentary rib cage pair scapulae pair clavicles sternum pair humeri (distal 1/3 right missing) pair radii pair ulnae both hands (almost complete) pair innominates pair femora
Age:	middle aged adult
Sex:	male
Stature:	174.57 cm (length femur)
Pathology:	1) embedded flint right lateral body T6. 2) embedded flint left innominate posterior to acetabulum. 3) arthritic change left elbow, involving humerus, radius & ulna. 4) arthritic change right elbow, involving radius & ulna (distal right humerus missing). 5) degeneration spine from T6 to T10 & L3 + L4.
Comment:	patellae, lower legs & feet missing.
Additional bones:	fragments cranium vertebra & rib,

Year:	1989
M No:	M39 (Individual 2)
Bones present:	fragments cranium right scapula right clavicle two fragments ribs proximal ½ left humerus distal ½ right humerus proximal ½ left femur fragment fibula
Age:	foetus/neonate (dimensions very close to Fazekas & Kosa's 10-lunar-month-old male foetus)
Sex:	?
Stature:	?
Pathology:	none
Comment:	different individual to M39a
Additional bones:	none

Year: 1989

M No: M39a

Bones present: 5 fragments cranium
mandible
right clavicle
pair scapulae, incomplete
21 pieces complete or fragmentary ribs
10 unfused parts vertebrae
pair ilium
right humerus
pair radii
right ulna
pair femora
pair tibiae
3 fragments fibula shaft
9 metacarpals/metatarsal
7 phalanges of hand or foot

Age: foetus/neonate (dimensions closest to, if slightly smaller than, Fazekas & Kosa's 10-lunar-month-old male foetus)

Sex: ?

Stature: ?

Pathology: none

Comment: 'Child bones and fish teeth'. Said to have been found near M39 on the right side of M39's head lying with the face towards the Danube. All of the bones were covered in red ochre.

Additional bones: none

Year:	1989
M No:	M40
Bones present:	fragmentary skull mandible almost complete spine pair scapulae pair clavicles fragmentary rib cage sternum pair humeri pair radii pair ulna pelvis pair femora pair patellae pair tibiae pair fibulae both feet (incomplete)
Age:	15-18
Sex:	female
Stature:	162.31 cm (lengths humerus + femur + tibia)
Pathology:	1) embedded bone point in proximal end left humerus. 2) impaction injury? anterior body L3.
Comment:	complete skeleton apart from missing hands
Additional bones:	none

Year:	1991
M No:	M42
Bones present:	skull mandible full dentition most of spinal column most of rib cage, fragmentary pair clavicles pair scapulae, neither complete almost complete sternum pair humeri pair radii pair ulnae pair innominates pair femora pair patellae pair tibiae pair fibulae, shafts only both hands, incomplete both feet incomplete
Age:	45+ (advanced attrition, all segments of sacrum and sternum fully fused, xiphoid process starting to fuse to body of sternum, morphology of pubic symphysis (Gilbert & McKern's Stage 5),
Sex:	female (morphology & dimensions of sacrum, wide sciatic notch, ventral arc, long pubis, marked preauricular sulcus)
Stature:	163.80 ± 3.51 cm (combined lengths humerus, femur & tibia)
Pathology:	1) healed depressed skull fracture in centre of occipital immediately above superior nuchal line. The oval depression measures 36 mm wide x 25 mm long. There is some periosteal reaction within the depression, along superior nuchal line and above depression. 2) the right head of mandible is flattened and pitted. 3) periodontal disease - slight to moderate resorption of alveolar bone with pitting along margins and on crests between teeth. Large periodontal pocket at the area around upper right M2. 4) arthritis of neck with lipping around dens of axis and facet for dens on atlas. The right inferior facet of the axis, right superior and inferior facets of C3 and right superior facet of C4 are enlarged and grossly lipped. The right inferior facet of C4 appears unaffected. C5 and C6 are missing. The right

inferior facet of C7 and right superior facet of T1 are similarly enlarged and lipped. Lipping is present around bodies of axis, and inferior body of C3.
5) lipping and pitting of facets of both transverse processes and inferior costal facets of T8, more marked on the right side.
6) facets on both transverse processes of T10 are enlarged, pitted and lipped and moderate lipping surrounds the inferior body edge with slight lipping around superior edge of body of T11.
7) lipping around inferior facets of T12, and superior and inferior facets of L1. Superior facets of L2 and L3 are grossly enlarged, pitted and lipped. Similar, but less severe changes have affected the inferior facets of these vertebrae. Slight lipping around inferior body edges of L2, L3, L4 & L5.
8) pitting and lipping of most of the articular surfaces of the ribs, degree varies throughout rib cage but generally more marked on the lower ribs.
9) lipping and pitting of both sternal articular surfaces of clavicles and lipping of the right acromial end.
10) lipping around clavicular surface of right acromion of scapula, slight lipping around both glenoid cavities. Slight lipping around both heads humerus.
12) slight lipping around trochlea of left humerus with bony growth in olecranon; moderate lipping around left trochlea and capitulum, eburnation on trochlea and two large, facet-like areas of bony growth at the coronoid and radial fossa and marked irregular growth in the olecranon. Lipping around right radio-ulnar articulation on both bones and around both semilunar notches, more marked on right.
13) 1st proximal phalanx foot with healed fractures at the base (oblique fracture) and below the head (transverse fracture), with callus formation and slight deviation.

Comment:

1) narrow or long-headed with high skull.
2) skull sexually undiagnostic, length clavicle sexually indeterminate, length of glenoid cavities and diameter humeral and femoral heads and bicondylar width within the range for modern males.
3) left scaphoid & lunate fused to distal end radius by post mortem concretion

Additional bones:

distal ½ left humerus from child of about 6-7 years.
complete right ulna from adult male; height 186.90 cm; marked lipping around distal articulation.
distal ¾ right tibia
distal end left femur (robust & probably male)

Year: 1991

M No: M43

Bones present:
skull
mandible
full dentition
hyoid
spine (T9-T11 missing)
sternum
fragmentary rib cage
pair scapulae
pair clavicles
right humerus (proximal 1/3)
pair radii
right ulna
pair innominates
pair femora
pair patellae
left fibula (head missing)
right hand (incomplete)
right foot (incomplete)
left talus

Age: adult 25-30 (first body of sacrum not yet fused to second, sternal epiphyses of clavicles undergoing terminal union, slight to moderate dental attrition (Brothwell's 25-35), greater horns of hyoid unfused, morphology of pubic symphysis – Todd's Phase IV or V – age range 25-30)

Sex: male (very robust skeleton, pronounced supraorbital ridges, nuchal crest, and mastoid processes, gonial angles of mandible flared, broad ramus, square chin, dimensions of glenoid cavities, humerus, and femur, narrow subpubic angle, narrow sciatic notch, no preauricular sulcus

Stature: 181.53 ±3.94 (length femur)

Pathology: 1) healed wedge compression fracture of T12 affecting the right anterior third of the superior body surface. Probably associated with this injury are slight lipping of the right inferior facets of T4, T5, T6 and T12, lipping, pitting and enlargement of the left inferior facet of T8, linear lesions with slight splaying and lipping of the inferior body surfaces of T7 and T8 and enlargement and slight lipping of the left inferior facets of L1, L2 and L5, left superior and inferior facets ofL3 and L4. There is also slight mal-alignment of both inferior facets of L4. Although there appeared to little displacement

from the fracture, it seems to have resulted in the rupturing of the intervertebral discs at T7/8 and T8/9 and some kyphoscoliosis of the spine. The full extent of the injury is not clear because T9-T11 are missing.
2) slight to moderate lipping around articulations of several bones of the right foot.

Comment: 1) narrow or long-headed with high skull
2) numerous sutural bones in lambdoid suture
3) distal end left fibula burnt black

Additional bones: 2 articulating CVs
complete sacrum, fully fused, from an adult male
left clavicle belonging to a female, aged 25-30?
shaft & distal end left radius
distal 1/3 ulna
proximal ¼ left fibula
complete left 1st metatarsal
right 3rd & 4th metatarsals from same individual
5 phalanges foot

Year:	1991
M No:	M44
Bones present:	skull
Age:	adult age may have been around 35 years (M3s erupted, moderate attrition, cranial sutures obliterating internally)
Sex:	male (pronounced supraorbital ridges, nuchal crest, external occipital protuberance and mastoid processes)
Stature:	?
Pathology:	alveolar bone loss of 3.5 mm with slight pitting indicates the presence of periodontal disease
Comment:	1) found in a 'pit' with 2 other skulls 2) the top of the cranium, an area of about 80 mm in diameter, was unusually polished and smooth, identical to M45.
Additional bones:	none

Year:	1991
M No:	M45
Bones present:	skull with part of dental arcade
Age:	adult – early 20s? (M3s erupted, attrition slight (Brothwell's 17-25), cranial sutures still fully visible)
Sex:	female (brow ridges and occipital protuberance not pronounced, upper orbit edges were fine and sharp, frontal profile rounded, mastoid processes are small and pointed.
Stature:	?
Pathology:	both internal auditory meati abnormally large, more marked on the right. No associated evidence of infection or reactive bony growth so unclear whether manifestation is pathological.
Comment:	1) found in a 'pit' with 2 other skulls 2) the top of the cranium, an area of about 80 mm in diameter, was unusually polished and smooth, the same as M44.
Additional bones:	none

Year:	1991
M No:	M46
Bones present:	skull mandible full dentition complete spine left scapula right clavicle fragmentary rib cage left humerus left radius left ulna pair innominates pair femora right patella pair tibiae pair fibulae some bones from both hands few foot bones (unclear whether they belong to main skeleton)
Age:	c. 35-39 (sutures obliterating, extreme dental attrition, sacral bodies all fully fused, pubic symphysis – Todd's Phase VII – age 35-39)
Sex:	male (very pronounced external occipital crest, supraorbital ridges, wide heavy jaw, square chin, morphology of sacrum, dimensions of glenoid cavity, clavicle, humerus and femora, narrow subpubic angle and sciatic notch, short pubis, oval obturator foramen, funnel-shaped pelvic basin)
Stature:	178.28 (length femur)
Pathology:	1) alveolar bone loss 5.6 mm. Upper right third molar missing, probably pm, with evidence of infection in enlarged socket. Further periodontal pocket around lower left third molar. 2) pathological fusion with marked exostosis of left inferior facet of axis and left superior facet of C3 with left facets of C4, C5, C6 and C7 enlarged and lipped. The facet of the left transverse process of T1was grossly distorted by abnormal bony growth and there was a small area of eburnation present. The spines of T1-T4 were skewed to the left. The right costal facets of T1-T9 were enlarged pitted and lipped, while the lower costal facet of T3 had an area of eburnation. Lipping and eburnation was present on the facet of the right transverse process of T10 and on the right superior facet of T12. The superior and inferior facets of T12-L5. Lipping of body edges

had affected all vertebrae from T6 to the superior surface of L5.
3) mid-shaft fractures of left radius and ulna with angular malunion, overlapping of the broken ends and pseudo-articulation. (Fractures of radius & ulna at same level are caused by direct blow, Apley & Solomon188, p262)

Comment: 1) upper front incisors and canines worn to stumps

Additional bones: 1) right humerus from a female
2) articulating right radius and ulna, probably from a female, approximately 169.63 cm tall
3) left innominate with articulating proximal _ left femur from a male
4) left femur & acetabulum from a male approximately 187 cm tall
5) distal _ right femur and pair tibiae from a female
6) proximal _ right tibia
7) incomplete pair fibulae
8) left 4th metacarpal
9) left fifth metatarsal

Year: 1991

M No: M47

Bones present:
spine from axis to sacrum, fragmentary
right clavicle
pair scapulae
fragmentary rib cage
pair humeri
pair radii
pair ulnae
pair innominates
pair femora
left patella
right tibia
pair fibulae
both hands
both feet, incomplete

Age: young adult 25-26 (1st body sacrum unfused to 2nd, sternal epiphysis of clavicle ¾ fused, slight ossification of costal cartilage, iliac crest fused, morphology of pubic symphysis – Todd's Stage IV - age 25-26)

Sex: male (length glenoid cavity, diameter head of humerus and femur, narrow sciatic notch, no preauricular sulcus)

Stature: 174.80 ±3.94 (length femur)

Pathology:
1) fragment TV with an embedded flint point in the left pedicle. The point of entry appears to have been from above and downwards into the left side of the spine.
2) small fragment vertebra, probably part of a transverse process, with an embedded flint flake.
3) mid-shaft fracture of left ulna with large callus formation and no displacement (no corresponding fracture of the articulating radius) The bone had suffered a post mortem break at the fracture sight – possible indication that fracture only occurred recently before death.
4) site for interosseous ligament superior to the articular surface of the lateral malleolus of the left fibula has marked irregular bony growth. In addition, the inferior edge of the articulation is slightly lipped and the articulation itself appears flattened. Possible traumatic ligamentous damage.

Comment: 1) although this skeleton seems to be definitely male, it is much less robust that other Schela males.

1) 2 fragments of vertebrae, 3 metacarpals and 2 fragments iliac crest, probably not part of the main skeleton, burnt black

Additional bones: 1) immature CV from a child aged 3-7
2) at least 2 lumbar vertebrae
3) 9 fragments scapula
4) left distal end radius
5) 3 metacarpals from 2 individuals
6) articulating left calcaneus and talus

Year:	1991
M No:	M48
Bones present:	skull mandible full dentition almost complete spine pair scapulae right clavicle fragmentary rib cage pair humeri pair radii pair ulnae both hands, incomplete pair innominates left patella pair tibiae pair fibulae both feet, incomplete
Age:	25-30 (slight to moderate dental attrition, sternal epiphysis of right clavicle not quite united, fusion of the iliac crest)
Sex:	male (brow ridges, nuchal crest and mastoid processes very pronounced, length clavicle, diameter head humerus, narrow sciatic notch, no preauricular sulcus, bicondylar width)
Stature:	182.60 ±4.00 (length tibia)
Pathology:	none
Comment:	skeleton examined while on display in the museum at Turnu-Severin
Additional bones:	1) cervical vertebra 2) right clavicle

Year: 1991

M No: M49

Bones present:
skull
mandible
full dentition
almost complete spine
pair scapulae
pair clavicles
fragmentary rib cage
pair humeri
pair radii
pair ulnae
pair innominates
pair femora
pair tibiae
pair fibulae
right hand (minus phalanges)
both feet (minus phalanges)

Age: 35-45 (moderate to advanced dental attrition, cranial sutures partly obliterated, all 5 sacral bodies fused, sternal epiphyses of clavicles fully united, moderate degree of ossification of costal cartilages, pubic symphyses worn smooth – Gilbert & McKern's Phase 4)

Sex: female (small mastoid processes, rounded chin, supraorbital ridges and external occipital crest moderately pronounced, length clavicles, long pubic bone, fairly wide sciatic notch, preauricular sulcus, ischium-pubic index)

Stature: 170.12 ± 3.51 cm (combined lengths humerus, femur & tibia)

Pathology:
1) moderate to severe periodontal disease - 4.5+ mm resorption with pitting. Periodontal pockets around upper and lower right 1st molars.
2) slight to moderate lipping around inferior/superior edges of T6/T7, T7/T8, T8/T9, T9/T10, T10/T11, L2/3, L3/4, L4/L5 and L5/S1. Slight to moderate lipping was also present on some facet joints.
3) glenoid cavities and facet for acromioclavicular joint flattened with pitting on the articular surface and lipping around, more marked on the left. No evidence of corresponding lesions on the humeral heads.
4) sternal and acromial articulations of the clavicle are worn, pitted and slightly lipped.

5) The right ulna has been fractured at about its lower third. The fracture has failed to unite and the two un-united ends are surrounded by irregular bony growth. It appears that limited movement was possible. It is likely that the break occurred by a direct blow. It is possible that this fracture caused stress on the elbow joint, especially if there was associated dislocation of the head of the radius, resulting in secondary osteoarthritis.
6) the right elbow joint is grossly affected by arthritis. The whole articulation is enlarged and surrounded by irregular growth, extending into the olecranon. Areas of eburnation are present on the capitulum and on the head of the radius.
7) lipping around the medial condyle of the right femur may be indicative of osteoarthritis.
8) lipping around the medial side of the medial condyles of both tibiae, more marked on the right.
9) healed mid-shaft fracture with some deviation and slight periosteal reaction of left 5th metatarsal. Some lipping around the proximal articulation indicates secondary arthritis.

Comment:

1) average or medium headed with a high skull
2) deep depressions at the site of attachment for the adductor longus on the external anterior surface of the pubic bone may be indicative of childbirth.

Additional bones:

1) left malar
2) fragment right maxilla with M2 & M3
3) acromial ½ left clavicle belonging to a male?
4) manubrium of sternum

Year: 1991

M No: M50

Bones present:

left petrous part temporal
mandible
fragment thoracic vertebra
upper lumbar vertebra
fragmentary right scapula with single fragment left
sternal ½ right clavicle
a few rib fragments
right humerus
pair radii
pair ulnae
both hands, incomplete
right innominate
right femur
right tibia
right fibula
both feet, incomplete

Age: 35-45 (moderate molar attrition, alveolar resorption 3-5 mm, marked degree of ossification of costal cartilage of right 1st rib

Sex: male (angular chin, dimensions humerus & femur, narrow sciatic notch, no preauricular sulcus

Stature: 181.63 cm ±4.00 (length tibia)

Pathology: 1) Part lamina and spine from a thoracic vertebra with an embedded bone point at the left base of the spine. The point protrudes through to the underside of the lamina by about 3 mm although as the tip of the point is broken off it is not clear by how much it originally protruded. The other end of the point has also been broken off; remaining length is 19.25 mm. The point appears to have entered the body horizontally from the back. The bone point undoubtedly entered the spinal column and as there was no sign of bone repair surrounding the point, death probably occurred if not immediately then soon after. (It is not clear whether this bone fragment belonged with the rest of the skeleton)

2) un-united shaft fracture at the distal third of right ulna without displacement. There is a great deal bony reaction of both ends at the fracture site with reactive growth and pitting and a general thickening of the shaft (a combination of callus formation and infection?). These changes suggest that infection had set in. Periosteal pitting is visible on the shaft of the lower part. The distal end is markedly affected by pitting

and reactive growth, possibly indicating that the fracture was accompanied by dislocation of the distal radioulnar joint.
3) Healed fracture at about approximately distal quarter of right fibula. Slight displacement is evident and some pitting and reactive growth on shaft indicates infection. The tibia is intact and there is no evidence of injury at the ankle. Fractures of the tibia shaft without involvement of the tibia or ankle are unusual and likely to have been caused by a direct blow.
4) both feet have erosive lesions with lipping of the heads of several metatarsals, more marked on the left.

Comment: 1) lipping around attachment for right costoclavicular ligament on scapula and 1^{st} rib.
2) distal end right radius and several hand bones are burnt

Additional bones: 1) upper right lateral incisor
2) upper left canine
3) right 1^{st} rib
4) right 4^{th} metatarsal

Year:	1991
M No:	M51 (Individual 1)
Bones present:	right innominate right femur right tibia right fibula right talus
Age:	adult (epiphyseal fusion)
Sex:	female (wide sciatic notch, dimensions femur)
Stature:	162.17 cm ±3.55 (combined length femur & tibia)
Pathology:	none
Comment:	fibula was broken into 3 pieces. The breaks appear old.
Additional bones:	none

Year:	1991
M No:	M51 (Individual 2)
Bones present:	left innominate pair femora pair tibiae pair fibulae pair calcanea pair tali
Age:	50+ (morphology pubic symphysis – Todd's Phase X)
Sex:	male (sciatic notch and subpubic angle narrow, dimensions femur)
Stature:	176.54 cm ±3.74 (combined length femur & tibia)
Pathology:	none
Comment:	innominate and left fibula were broken into several pieces. Breaks appeared old.
Additional bones:	none

Year:	1991
M No:	M51 (Individual 3)
Bones present:	right femur distal end left femur with left patella adhering pair tibiae pair fibulae
Age:	adult (epiphyseal fusion)
Sex:	male (dimensions femur, general robustness)
Stature:	176.94 cm ±4.00 (length tibia)
Pathology:	healed fracture distal 1/3 right fibula. Lipping around the distal articulation may be related.
Comment:	blackening on shafts of left tibia and fibula – unclear whether this is due to burning
Additional bones:	none

Year: 1991

M No: M51 (Individual 4)

Bones present:
fragmentary cranium
a few vertebrae
sternal ½ left clavicle
fragment right scapula
7 fragments rib shaft
sternum
left humerus, head missing
left radius
left ulna
right hand
left innominate
left femur
various foot bones

Age: adult (sternal epiphysis clavicle fully fused)

Sex: female (small mastoid processes, epicondylar width, wide sciatic notch)

Stature: 167.72 cm ±3.72 (length femur)

Pathology:
1) left radius with noticeable distortion at the distal end above the articulation, with thickening of the shaft and slight deviation, probably the site of a healed Colles fracture with slight displacement. A spicule of bone is present on the medial side above the ulnar notch. The spicule of bone probably indicates some disruption of the inferior radio-ulnar joint or tendon damage. Marked lipping with some eburnation around the distal radioulnar articulation of the left ulna suggests secondary arthritis. (Colles fractures are nearly always caused by a fall on an outstretched hand.)
2) pitting & eburnation on the articular surface for the capitate on right lunate.
3) there is a marked flattened area with lipping around on the medial side of the iliac crest of the left innominate at the point of origin of the quadratus laburnum muscle, which forms the posterior abdominal wall. The function of this muscle, which attaches to the 12th rib and the upper two lumbar vertebrae, is to stabilise the pelvis and lumbar spine. Contraction on one side assists in lateral flexion of the trunk. Using both sides stabilizes the lumbar vertebrae for strong activity of the upper trunk and upper limbs. This lesion may have been caused by traumatic damage to the muscle or by heavy occupational stress. Unfortunately the right bone is not present. Had a

similar lesion been present on the other side, the cause may have been more likely to be occupational in origin.

Comment: 1) all of the above bones are probably from a female, but it is not entirely certain that they are all from the same skeleton; some may belong to the other female identified from the bones of M51.

Additional bones:
1) fragment cranium
2) manubriums from 2 individuals
3) left radius and ulna, probably from a female
4) right radius, probably from a male
5) right ulna, not matching any of the above
6) right 4^{th} metacarpal

Year: 1992

M No: M52

Bones present: 3 lumbar vertebrae
fragmentary rib cage
right scapula
right humerus
right radius
right ulna
2 hand bones
fragmentary right innominate
right femur
one foot bone

Age: 40+ (incomplete pubic symphysis – elderly individual)

Sex: female (length glenoid cavity, dimensions of humerus and femur – sexually intermediate by modern standards but in view of the general robusticity of this population probably indicates female sex)

Stature: 170.53 cm ±4.45 (length humerus)

Pathology: 1) lipping around glenoid cavity, acromioclavicular joint of right scapula and lipping and pitting of the head of humerus indicates arthritis of the right shoulder.
2) lipping around head of femur and acetabulum indicates arthritis of the right hip.

Comment: fragment of burnt longbone shaft was found amongst these bones.

Additional bones: none

Year:	1992
M No:	M54
Bones present:	fragmentary cranium 1 cervical vertebra 4 thoracic vertebrae 2 lumbar vertebrae sacrum sternal ½ rib left humerus right ulna phalanx hand left innominate proximal ¼ right femur
Age:	adult (epiphyseal fusion, segments sacrum recently fused?
Sex:	male (general robusticity, morphology of sacrum, epicondylar width, no preauricular sulcus, size head femur,
Stature:	?
Pathology:	1) Schmorl's nodes on inferior surfaces of T9, T10, T12 and superior surfaces of T10 and T12. 2) Part of body of thoracic vertebra. A depression on the anterior edge of the inferior surface, associated with some collapse of the centre may possibly have been caused by a projectile, although there is no evidence of such a weapon.
Comment:	none
Additional bones:	1) left humerus from a female aged c.20 2) immature thoracic vertebra from a child aged c. 7-10 years

Year: 1992

M No: M55

Bones present: 2 hand bones
pair distal ends femora
pair tibiae
pair fibulae
both feet, incomplete

Age: 16-17 (distal epiphyses femora, proximal epiphyses tibiae fusing, distal epiphyses tibiae and proximal and distal epiphyses fibulae and those of foot bones recently fused)

Sex: female (bones gracile, bicondylar widths sexually intermediate, which generally means female with this population)

Stature: 169.70 cm ±3.66 (length tibia)

Pathology: none

Comment: none

Additional bones: 1) left patella
2) proximal phalanx toe

Year:	1992
M No:	M56
Bones present:	pair tibia pair fibula right terminal phalanx
Age:	adult (epiphyseal fusion)
Sex:	male (length lower legs, general robusticity)
Stature:	186.96 cm ±4.00 (length tibia)
Pathology:	1) raised area (10 x 6 mm) of reactive bone growth around mid-shaft of left tibia, just medial to anterior border, probably the result of a minor trauma.
Comment:	none
Additional bones:	none

Year:	1995
M No:	M95-1
Bones present:	fragmentary cranium left mandible unfused vertebral elements rib cage fragment clavicle distal ½ left humerus radius left ulna left femur right tibia several metacarpals/metatarsals & phalanges
Age:	neonate to 6 months (unfused metopic suture, dental development, length femur & tibia,
Sex:	?
Stature:	?
Pathology:	none
Comment:	there are several unidentified fragments, including longbone shafts that probably belong with this skeleton
Additional bones: individual	fragment right orbit with marked pitting from a smaller

Year: 1995

M No: M95-2

Bones present:
cranium (frontal area missing)
maxilla
mandible
dentition
hyoid
spine - atlas to T3
inferior sacrum
left clavicle
right scapula
fragmentary rib cage
proximal 1/3 right humerus
proximal phalanx hand
inferior part both innominates
pair femora

Age: 35-45 (fully obliterated sutures, moderate dental attrition, sternal clavicular epiphyses fully fused, S4 & S5 fused, hyoid bone fused)

Sex: male (very marked mastoid processes and external nuchal crest, length clavicle, dimensions scapula, humerus, femora, narrow sciatic notch)

Stature: ?

Pathology: 1) There was a large fracture across the left cranium from the left frontal area towards the centre of the cranium, which had partially displaced the bone. This must have occurred *peri-mortem.*
2) a small piece flint/stone is embedded at the area for attachment of the costoclavicular ligament of the left clavicle. There is also a possible cut mark at the attachment for conoid ligament on the same bone, although no evidence of flint flake.
3) part of a flint flake embedded in the anterior surface of body of T1.
4) hairline fracture of neck of right scapula (below and parallel to spine), terminating in a small depression. This must have resulted from a blow to the right upper back.
5) found with right humerus was a bone point, damaged at both ends, and of which 37 mm remains. It is clear that the bone point had been embedded within the bone but had fallen out when excavated or washed as the impression of the point could be seen within the soil inside the humerus and visible

from the broken end. The angle of entry was behind and slightly from below. The bone had shattered upon entry and some of the dislodged fragments (7) were present with the humerus. The broken end of the humerus has fracture lines and one partially dislodged flake of bone appears to be held in place by soil. Also found with the bone fragments was a flint flake. The relevance of this is not clear.
6) embedded bone point in left innominate, just lateral and superior to ischial tuberosity. 28 mm of point protruding. Point of entry from front and left, possibly skimming anterior femur, level with the greater trochanter/just below the neck. A further point, later removed, had penetrated about 20 mm below the top of and 15 mm lateral to, the greater sciatic notch. The point had just emerged into the acetabulum, just below the articular part. The point had penetrated 30 mm of bone. This point of entry was from the back and slightly downwards.
7) a depressed lesion on head of left femur appears to have occurred while the bone was still 'fresh' – probably related to embedded projectile in left innominate.
8) there is a diagonal 'cut' mark on gluteal tuberosity of right femur – skimmed by a projectile? – see above.

Comment: 1) red ochre staining on medial side left femur and inferior lateral side right femur.
2) quantities of red ochre were found beneath the left femur and around the skull.
3) two fragments of bone point and a flint flake were found beneath the left femur and a flint bladelet below a fragment of right rib
both femora truncated at about distal 1/3.
4) attempts at the removal of some of the missiles which had entered this man's body can be seen in the small fragment of a flint flake remaining in the left clavicle and the removal of what was probably a bone point from the left hip.
5) it is quite clear that this individual met with a very violent death; it is difficult to ascertain which of his many injuries actually killed him.

Additional bones: none

Year:	1995
M No:	M95/3
Bones present:	fragmentary cranium right mandible right scapula fragmentary rib cage unfused parts various vertebrae pair humeri left radius innominate pair femora left tibia metacarpals/metatarsals, phalanges
Age:	full term foetus/neonate (unfused metopic suture and basilar parts of occipital, length humerus,
Sex:	?
Stature:	?
Pathology:	none
Comment:	none
Additional bones:	1) right tibia (foetus/neonate) 2) radius (foetal) 3) distal femur (foetal/neonate) 4) petrous part temporal bone – adult

Year:	1995
M No:	Neolithic? skeleton
Bones present:	skull mandible full dentition spine atlas to T1 both scapulae pair clavicles proximal 1/3 left humerus distal 2/3 left radius distal 1/3 left ulna both hands
Age:	21-23 (unfused cranial sutures, sphenoid unfused to basilar part, slight dental attrition, recent fusion of epiphyseal ring on T1, unfused sternal epiphysis of clavicle)
Sex:	female (small mastoid processes, nuchal crest and brow ridges, small mandible, pointed chin, length glenoid cavity, diameter head humerus)
Stature:	155.85 cm ±5.57 (length 2^{nd} metacarpal)
Pathology:	1) both upper M1s and upper left M2 lost in vivo. Abscess pocket in socket of upper left M2. Root abscess at upper right M2, sinus had invaded lingual surface. Evidence of infection in socket for lower left M3 and lower right M2. Huge cavity in upper right M2, which has destroyed most of crown. The lower left M2 has completely decayed with only a badly decayed mesial root remaining. Large lesion in the centre of the occlusal surface of lower right M3. Small carious lesions in the occlusal surface of lower left M1 and tiny lesion in a fissure of right lower M1.
Comment:	average or medium headed with a high skull
Additional bones:	none

Year: 1996

M No: M96/1

Bones present: loose lower right third molar
6 fragments of rib
spine L2 to sacrum
pair innominates
pair femora
pair patellae
pair tibiae
pair fibulae
both hands, incomplete
both feet, incomplete

Age: c.20 (M3 recently erupted, epiphyseal rings on vertebrae starting to fuse, segments of sacrum starting to fuse, iliac crest fusing, pubic symphysis – Gilbert & McKern's Stage 1-2, epiphyses on leg bones fully fused)

Sex: female (wide sciatic notch, preauricular sulcus, deep pubic portion and wide subpubic angle)

Stature: 170.99 cm ±3.55 (combined length femur & tibia)

Pathology: 1) sacral crest open from just below S3

Comment: 1) patellae and femoral head fused in full articulation by *post mortem* concretion.
2) not certain that loose M3 is part of the main skeleton but is on the same age.
3) dimensions of femur sexually indeterminate

Additional bones: none

Year: 1996

M No: M96/2

Bones present:
left maxilla
mandible
part dentition
hyoid
sternum
fragmentary rib cage
pair clavicles
pair scapulae
complete spinal column
pair humeri
pair radii
pair ulnae
pair innominates
pair femora
pair patellae
pair tibiae
pair fibulae
both hands, incomplete
both feet, incomplete

Age: 25-30 (slight to moderate attrition, medial epiphyses of clavicles almost fully united, manubrium unfused to body of sternum, slight ossification of costal cartilage). (However, the morphology of the pubic symphysis indicates that the individual may have been older and appears to be closest to Todd's Stage VII, i.e. an age of between 35 and 39.)

Sex: male (dimensions and morphology of the sacrum, very narrow sciatic notch and subpubic angle, no preauricular sulcus, dimensions of scapula, clavicle, humerus and femur)

Stature: 173.29 cm ±3.74 (combined length femur & tibia)

Pathology: 1) deep concavity at sternal articulation of right clavicle with large pit, reactive growth and lipping around facet. A deep notch is present on the inferior aspect of this articulation and there is new bone at the area for attachment of the costoclavicular ligament. The acromioclavicular facet on the right scapula is well defined but there is no evidence of any pathological change. In addition, the right clavicular notch on the sternum is larger than on the left and there are deep pits and irregular growth just inferior to the notch on both front and back aspects. Evidence of a possible dislocation of the acromioclavicular joint?

2) Asymmetry of C7. The spine is skewed to the left; the right lateral 'lip' of the superior surface of the body is higher than on the left; the right foramen is very small while the left is elongated; the left area of the transverse process is much larger than the right with an elongated bony extension on the posterior tubercle and a smaller extension on the anterior tubercle. This asymmetry is also visible on the superior part of T1, with some destruction of the right lateral body.
3) slight bulging on the left anterior bodies of T9; the body of T10 bulges to the left superiorly, and to the right inferiorly; the bodies of T11, T12 and L1 very clearly bulge to the right. The bulging disappears at the level of L2.

Comment:

1) septal aperture on left humerus, not present on right.
2) muscle markings more marked on the left humerus, radius and ulna than on the right. Individual may have been left-handed or this may indicate greater usage of the left arm following the injury to the right shoulder.
3) both femora and the right patella are fused in full articulation by post mortem concretion.
4) two spicules of bone, about 30 mm apart, jutting out from two linear raised areas, on the interosseous border, at about distal third of the right fibula. Possible partial bifurcation? Not present on the left. Slight lipping around distal articulations of both fibulae

Additional bones:

1) right 5th metacarpal
2) proximal phalanx foot
3) two fragments of immature rib shaft – probably foetal.

Year: 1996

M No: M96/3

Bones present:
fragmentary cranium
mandible
fragmentary rib cage
spinal column
pair scapulae
pair clavicles
pair humeri
pair radii
pair ulnae
right ilium
pair femora
pair tibiae

Age: c. 5-7 years (dental development (including erupting M1), moderate wear on deciduous teeth, bodies vertebrae unfused to arches, length clavicle, longbones)

Sex: ?

Stature: ?

Pathology: none

Comment: 1) several unidentified fragments of bones

Additional bones:
1) proximal ½ right femur, belonging to an infant of a few months
2) fragment of atlas belonging to an adult

Year: 1996

M No: M96/4

Bones present: atlas
lumbar & sacral spine
distal ½ left radius
distal ½ left ulna
left hand, incomplete
pair innominates, fragmentary
pair femora, proximal ¾ only
fragments tibial shaft

Age: middle-aged adult (full epiphyseal fusion, morphology of pubic symphysis)

Sex: female (wide sciatic notch, preauricular sulcus, long pubis, dimensions of femoral head sexually diagnostic but in this population probably indicates female sex)

Stature: ?

Pathology: 1) slight lipping around the facet for dens on atlas
2) large Schmorl's nodes on both body surfaces of L1 and superior surface of L2. Slight lipping around upper body edge of L2.
3) slight lipping around head of left femur

Comment: 1) several unidentified bones

Additional bones: 1) head right mandible

Year:	1996
M No:	M96/5
Bones present:	fragmentary cranium spine pair scapulae rib cage pair clavicles pair humeri fragment radius left ulna pair ilia pair femora right tibia shaft fibula
Age:	neonate to 6 months (width pars basilaris indicates approximately 5 months (Scheuer and McLaughlin-Black, 1994), length clavicles, length longbones)
Sex:	?
Stature:	?
Pathology:	1) bony changes, in the form of platelets of laid down bone and pitting, in the right orbit, right malar, and on the external surface of several fragments of cranium
Comment:	1) several unidentified fragments of bones
Additional bones:	1) left temporal belonging to an infant 2) left pars lateralis from a foetus/neonate 3) left ischium from a foetus/neonate

Year:	1996
M No:	M96/6
Bones present:	fragmentary cranium spine rib cage right humerus shaft radius left ilium pair femora pair tibiae
Age:	full term foetus/neonate (dimensions of ilium and longbones)
Sex:	?
Stature:	?
Pathology:	none
Comment:	1) 4 fragments immature longbone shafts
Additional bones:	1) fragment adult cranium 2) middle phalanx hand – adult

Year: 1996

M No: M96/7

Bones present: spine from C6 to L5
left ribs
both hands, incomplete
left femur
pair tibiae
both feet, incomplete

Age: adult (epiphyseal fusion)

Sex: male (dimensions femur)

Stature: 176.30 cm ±3.74 (combined lengths femur & tibia)

Pathology: 1) moderate lipping around bodies of L2/L3 and slight lipping L3/L4 and L4/L5.
2) lipping around facets on heads/tubercles on left ribs nos. 5, 6, 7 and 9.
3) slight lipping around medial condyle and intercondylar eminence of left tibia, and marked lipping around and eburnation on lateral condyle of right tibia. (No corresponding pathology on left femur; right femur is missing.)
4) pathological fusion of middle and terminal phalanges of foot. Lipping visible and lateral and medial sides of fused base of terminal phalanx and around base of middle phalanx.

Comment: 1) right talus and navicular fused by post mortem concretion.

Additional bones: 1) immature proximal phalanx hand

Year:	1996
M No:	M96/8
Bones present:	skull mandible full dentition hyoid complete spinal column incomplete rib cage manubrium of sternum pair clavicles pair scapulae pair humeri pair radii pair ulnae both hands, incomplete right femur right patella pair tibiae pair fibulae both feet, incomplete
Age:	c. 35 (moderate to advanced attrition, both horns of hyoid fused, all segments of sacrum fused, moderate ossification of costal cartilage, medial clavicular epiphyses fully fused)
Sex:	male (very pronounced brow ridges, large mastoid processes, chin markedly square and pronounced, massive manubrium, dimensions scapula, clavicle, humerus & femur)
Stature:	177.29 cm ±3.74 (combined lengths femur & tibia)
Pathology:	1) remodelling of bone in maxillary sinuses, indicating sinusitis. 2) slight lipping and pitting present on inferior facets of atlas and superior facets of axis. Slight lipping around facet for dens of axis and on dens itself. No other obvious pathology on remainder of cervical spine. Slight lipping at the base of body, inferior facets and costal facets of T8. Slight lipping on superior body and moderate lipping on inferior body of T9. All facets of T9 also lipped. T10 has moderate lipping around both body edges and slight loss of anterior body height. T11 has moderate lipping of both body edges, more marked inferiorly, moderate loss of anterior body height and marked pitting of right costal facet. T12 has slight to moderate lipping on the superior body surface and the right costal facet is very poorly defined with irregular growth. On the lumbar spine there is

slight to moderate lipping between the body surfaces of L3 & L4 and slight on L4 to L5. Most of the facet surfaces are obscured through pm concretion.
3) lipping and pitting of articular facets on several ribs.
4) besides lipping and pitting of the heads and tubercles, 2 right ribs have small pits along the length of the external surface of body and along the costal groove on the internal surface and the whole rib is thickened. The significance of these manifestations is not clear.
5) right typical rib with thickening and deviation of the shaft near the sternal end, indicating a healed fracture.
6) left rib with callous formation and periostitis near sternal end, indicating a healed fracture.
7) 3 lower left ribs with periosteal reaction on external and inferior surfaces of bodies and pitting and lipping of facets on heads.
8) the right clavicle has a pitted lesion at the attachment for the costoclavicular ligament and the sternal articular facet is deep, pitted and lipped. Possible dislocation of the acromioclavicular joint.
9) moderate lipping at the distal ends of both humeri, radii and ulnae, with irregular growth in the olecranon and coronoid fossas.
10) articulating middle and terminal hand phalanges with gross lipping and eburnation of both surfaces of the disto-interphalangeal joint.
11) articulating left 1st metacarpal and proximal phalanx with marked lipping of the metacarpo-phalangeal joint.
12) slight lipping around distal end right femur, moderate lipping and pitting of articular surfaces of right patella.
13) a large pitted exostosis on the site for attachment of the abductor hallicus and pitting on the site for attachment of the peroneus longus and brevis muscles on both calcanea and a large exostosis on the inferior edge of both naviculars, may be indicative of plantar faciitis, which would have been aggravated by walking. These pathological changes may result from injury to the 'spring ligaments, associated with the medial longitudinal arch, which may have occurred as the result of a fall landing on the feet
14) slight lipping around head of first left metatarsal, and large pits and irregular growth on and proximal to the medial side of head. Slight lipping around bases of 2nd, 3rd and 4th. Slight lipping is present around base of 5th metatarsal and the lateral inferior side of the head is enlarged and pitted. Slight lipping is present around the bases of right 2nd, 3rd and 4th metatarsals. The 5th has slight lipping around the proximal articulation and enlargement of the lateral inferior side of the head with pitting, although is not as marked as on the left. Of

five proximal phalanges, four have distorted heads with punched out lesions, while three have enlargement of the bases, one being very marked and 'knobbly'.
14) healed fracture, involving the articulation, of the right 1st terminal phalanx.

Comment: 1) narrow or long-headed with a high skull

Additional bones: 1) immature left humerus and arch vertebra from a foetus/neonate.
2) left upper 2nd molar.
3) right petrous part temporal
4) right talus

Year:	1996
M No:	M96/9
Bones present:	pair radii left innominate pair femora pair tibiae right fibula
Age:	adult (epiphyseal fusion)
Sex:	male (narrow sciatic notch, no preauricular sulcus, dimensions of femur)
Stature:	180.67 cm ±3.74 (combined length femur and tibia)
Pathology:	none
Comment:	1) radii may not be from the same individual as other remains
Additional bones:	radii? – see above1)

Year:	1996
M No:	M65
Bones present:	spine - T12 to sacrum part of rib cage pair radii pair ulnae distal ½ right humerus both hands, incomplete pair innominates distal end left femur pair tibiae pair fibulae both feet, incomplete
Age:	50+ (morphology pubic symphysis – Todd's Phase X)
Sex:	male (dimensions humerus, very narrow sciatic notch, short pubic bone, narrow subpubic angle)
Stature:	185.99 cm ±4.00 (length tibia)
Pathology:	1) lipping around distal articulation of right humerus and proximal end left ulna. 2) Schmorl's nodes on superior surface of L1. Moderate lipping around both body surfaces of L3 and superior surface of L4. 3) left 5th metatarsal has marked erosive lesion on tuberosity of the base, around 5 mm lost, and lipping around the articular surface.
Comment:	none
Additional bones:	none

Year:	1996
M No:	M69
Bones present:	pair femora pair patellae pair tibiae pair fibulae both feet
Age:	adult (epiphyseal fusion)
Sex:	male (dimensions femur)
Stature:	187.68 cm ±4.00 (combined lengths femur & tibia)
Pathology:	1) healed mid-shaft fracture of left femur, with mal-union resulting in approximately 17 mm loss of height. Spicules of bone over fracture site may indicate infection.
Comment:	none
Additional bones:	none

Year	M No or Locus	Skull	Teeth	Spine	Shoulder	Thorax	Arms	Hands	Pelvis	Legs	Feet	Age	Sex	Disease	Enthesopathy	Projectile	Fracture	Other Trauma	Extra Bones	Comments
1965	SB Sq 2 1m	no	no	yes	yes	yes	yes	yes	yes	yes	no	adult	M	spine	clavicles	no	no	no	yes	
1967	M1	no	no	yes	yes	yes	yes	yes	yes	yes	yes (L)	young adult	F	no	pelvis	no	no	no	yes	calcium carbonate concretion
1967	M1 bis (mixed remains)	no	no	yes	no	yes	yes	yes	yes	yes	yes	16-23; adult	F; F	no	no	yes (2)	no	no	mixed remains	
1967	Complex Epi (mixed remains)	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	under 20; middle aged	M; M?	spine; feet	no	yes	metacarpal?	no	yes	extra immature bones
1968	M2	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	older adult	M	spine; pelvis; foot	no	no	no	no	yes	
1868	M3	yes	yes	yes	no	no	no	no	no	no	no	adult	?	no	no	no	no	no	no	
1968	M3a	yes	yes	no	no	no	no	no	no	no	no	adult	?	no	no	no	skull?	no	no	carps' teeth
1968	Largirea 1	yes	no	yes	yes	yes	no	no	no	no	no	adult	M	spine, R shoulder	no	no	no	no	no	
1968	Largirea 1,55	yes	yes	yes	no	no	no	no	no	no	no	45+	M	mandible, dentition	no	no	mandible, skull	yes	no	perimortem cut marks/fracture on skull
1968	Schelet ous la vatra (mixed remains)	yes	yes	yes	no	no	no	no	no	no	no	adult	M; ?	no	no	no	no	no	no	
1982	M1	yes	yes	yes	yes	yes	yes	no	yes	yes	no	older adult	M	spine, shoulders, elbows, R wrist	scapulae	no	no	no	yes	
1982	M3	no	no	yes	no	yes	yes	no	yes	yes	yes	adult	F	sacrum, spine, hips, tibia, L ankle, both feet	pelvis	no	no	no	yes	
1982	M5	yes	no	yes	no	yes	yes	yes	yes	yes	no	older adult	M	spine, R elbow, both hips, both knees, R wrist	no	no	skull	no	yes	
1983	M6	yes	no	yes	yes	yes	yes	phalanx	no	yes	no	adult	F	no	no	no	no	no	no	2 quartz flakes
1983	M12	yes	yes	yes	yes	no	no	phalanx	no	no	no	adult	?	no	no	no	no	no	yes	flint flake
1983	SVI, 10a-11a, 0.85	no	no	yes	yes	yes	no	2 bones	no	no	yes	adult	?	no	no	no	no	no	yes	bones may not be from same individual
1983	SVI, Sq 12, 0.90	yes	no	yes	yes	yes	no	yes	no	no	1 bone	young adult	?	foot	no	no	no	no	no	
1983	SVI, Sq 11, 0.65	yes	yes	yes	yes	yes	yes	yes	no	yes	1 bone	adult	F	no	no	no	no	no	yes	piece quartz
1983	SVI, Sq 10a, 0.45	no	yes	yes	yes	yes	yes	yes	no	1 fg	1 fg	adult	F	spine, elbow?	no	no	no	no	yes	septal apertures both humeri
1983	SVI, Sq 10, 0.55	no	yes	no	yes	no	yes	no	2 frgs	no	no	older adult	?	teeth	no	no	no	no	no	bones may not be from same individual
1984	M16	yes	yes	no	no	yes	yes	no	yes	yes	yes	c. 18	F	hypoplasia, left knee	no	no	no	no	yes	
1984	M17	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	c.21	M	hypoplasia, caries	no	no	no	no	yes	
1984	M18	no	no	yes	no	yes	yes	yes	yes	yes	yes	older adult	M	spine, R elbow, L knee, both thumbs	femora	no	6 ribs	no	no	L foot bones reddened - possible burning?
1984	M19	no	no	yes	no	yes	yes	yes	yes	yes	yes	adult	F	sacrum	pelvis	no	4 metatarsals	no	no	
1984	M23	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	c.25	M	spine, ribs, L radius, L ulna, L femur, R fibula, both feet	clavicles	no	?	no	yes	
1984	M24	no	no	yes	no	ribs	yes	4 bones	yes	yes	yes	middle-aged	M	spine, R elbow, L foot	femora	no	R 1st metacarpal	no	no	
1986	M29	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	middle-aged	M	ribs, spine, L sacro-iliac joint, L knee, R foot	no	no	rib	no	yes	L innominate & L femur reddened
1986	M30	yes	yes	no	no	no	no	no	no	no	no	adult	M?	no	no	no	no	no	no	
1986	M31	yes	no	no	no	no	no	no	no	no	no	adult	?	no	no	no	skull	no	no	
1986	M33	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	50+	M	ribs/spine, feet	no	no	L femur	no	no	
1986	M33	yes	no	no	no	yes	yes	no	no	yes	no	foetus/ neonate		cranium, orbits	no	no	no	no	no	
1988	M37	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	older adult	F	spine, ribs, both hips, both feet	no	no	metatarsal	no	yes	
1988	M38	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	45+	F	caries, spine, ribs, L hand, both feet	no	no	no	no	yes	3 fragments shell

Year	M No or Locus	Skull	Teeth	Spine	Shoulder	Thorax	Arms	Hands	Pelvis	Legs	Feet	Age	Sex	Disease	Enthesopathy	Projectile	Fracture	Other Trauma	Extra Bones	Comments
1988	M38	yes	no	no	no	yes	yes	no	no	yes	yes	foetus/ neonate		no	no	no	no	no	no	
1989	M39 (1)	yes	yes	yes	yes	yes	yes	yes	yes	femurs	no	25-35	M	both elbows, spine	lower arms, clavicles, masseters	yes (2)	no	no	no	
1989	M39 (2)	yes	no	no	yes	yes	yes	no	no	yes	no	foetus/ neonate		no	no	no	no	no	no	found with fish teeth
1989	M39a	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	foetus/ neonate		no	no	no	no	no	no	all of the bones were covered in red ochre
1989	M40	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	15-18	F	no	no	yes	no	?	no	damage to vertebrae may have occurred around time of death
1991	M42	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	45+	F	jaw, periodontitis, spine, ribs, both shoulders, both elbows	no	no	skull, hand phalanx	no	yes	
1991	M43	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	25-30	M	feet	no	no	vertebra	no	yes	
1991	M44	yes	yes	no	no	no	no	no	no	no	no	adult	M	periodontitis	no	no	no	no	no	top of cranium unusually polished and smooth
1991	M45	yes	yes	no	no	no	no	no	no	no	no	young adult	F	ears?	no	no	no	no	no	top of cranium unusually polished and smooth
1991	M46	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	35-39	M	periodontitis, spine	no	no	L radius & ulna	no	yes	#s of radius & ulna at same level - caused by direct blow
1991	M47	no	no	yes	yes	yes	yes	yes	yes	yes	yes	25-26	M	no	no	yes - 2	L ulna	yes	yes	burning of some additional bones
1991	M48	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	25-30	M	no	no	no	no	no	yes	
1991	M49	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	35-45	F	periodontitis, spine, shoulders?, R elbow, both knees	pelvis	no	R ulna, L 5th metatarsal	no	yes	
1991	M50	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	35-45	M	feet	no	yes	R ulna, R fibula	no	yes	
1991	M51	no	no	no	no	no	no	no	yes	yes	yes	adult	F	no	no	no	no	no	no	old post mortem breaks
1991	M51	no	no	no	no	no	no	no	yes	yes	yes	50+	M	no	no	no	no	no	no	old post mortem breaks
1991	M51	no	no	no	no	no	no	no	no	yes	no	adult	M	no	no	no	R fibula	no	no	blackening on shafts tibia & fibula
1991	M51	no	no	yes	yes	yes	yes	yes	yes	yes	yes	adult	F	R hand	iliac crest	no	L radius	no	no	
1992	M52	no	no	yes	yes	yes	yes	no	yes	yes	no	40+	F	R shoulder, R hip	no	no	no	no	no	single fragment long bone shaft burnt
1992	M54	yes	no	yes	no	no	yes	no	yes	yes	no	adult	M	spine	no	yes	no	no	no	
1992	M55	no	no	no	no	no	no	no	no	yes	yes	16-17	F	no	no	no	no	no	no	
1992	M56	no	no	no	no	no	no	no	no	yes	no	adult	M	no	no	no	no	yes	no	
1995	M95-1	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	neonate to 6 months	?	no	no	no	no	no	no	fragments red ochre found w. bones
1995	M95-2	yes	yes	yes	yes	yes	yes	no	yes	yes	no	35-45	M	no	no	yes - 5	skull, scapula	no	no	2 fragments of bone point & 2 flint flakes found w. bones
1995	M95-3	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	foetus/ neonate	?	no	no	no	no	no	yes	
1996	M96-1	no	no	yes	no	no	no	yes	yes	yes	yes	c.20	F	spina bifida?	no	no	no	no	no	
1996	M96-2	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	25-30	M	spine	no	no	no	yes	yes	
1996	M96-3	yes	yes	yes	yes	yes	yes	no	yes	yes	no	5-7	?	no	no	no	no	no	yes	
1996	M96-4	no	no	yes	no	no	yes	yes	yes	yes	no	middle-aged	F	spine	no	no	no	no	yes	
1996	M96-5	yes	no	yes	yes	yes	yes	no	yes	yes	no	5 months	?	cranium, orbits	no	no	no	no	no	
1996	M96-6	yes	no	yes	yes	yes	yes	no	yes	yes	no	foetus/ neonate	?	no	no	no	no	no	no	

Year	M No or Locus	Skull	Teeth	Spine	Shoulder	Thorax	Arms	Hands	Pelvis	Legs	Feet	Age	Sex	Disease	Enthesopathy	Projectile	Fracture	Other Trauma	Extra Bones	Comments
1996	M96/7	no	no	yes	no	yes	no	yes	no	yes	yes	adult	M	spine/ribs, R knee, foot	feet	no	no	no	yes	
1996	M96/8	yes	yes	yes	yes	yes	yes	yes	no	yes	yes	c.35	M	sinuses, ribs, spine, R shoulder, both elbows, hands, R knee, both feet	feet	no	two ribs, big toe	no	yes	
1996	M65	no	no	yes	no	yes	yes	yes	yes	yes	yes	50+	M	both elbows, lumbar spine	no	no	no	no	no	
1996	M69	no	no	no	no	no	no	no	no	yes	yes	adult	M	no	no	no	femur	no	no	

Year	M No./ Locus	Sex	Bone	Measurement (mm)	Stature (cm)	Stature (in)	+/-	Male Height	Female Height
1965	SB Sq2 1m	M	radius	270	181.75	71.56	4.66	181.75	
1967	M1	F	humerus+femur+tibia	309; 427; 348	161.11	63.43	3.51		161.11
1967	M1 bis	F (1)	ulna	257	167.50	65.94	4.30		167.50
1967	M1 bis	F (2)	tibia	382	172.31	67.83	3.66		172.31
1967	Complex Epi	M	metatarsal	76	175.36	69.04	6.76	175.36	
1967	Complex Epi	M (?)	metatarsal	78	178.08	70.10	6.76	178.08	
1968	M2	M	none						
1968	M3	?	none						
1968	M3a	?	none						
1968	Schelet ous la vatra	M	none						
1968	Schelet ous la vatra	?	none						
1982	M1	M (1)	femur	490	179.21	70.56	3.94	179.21	
1982	M1	M (2)	femur+tibia	510; 422	184.13	72.49	3.69	184.13	
1982	M3	F	femur+tibia	418; 345	159.09	62.64	3.55		159.09
1982	M5	M	femur	500	181.53	71.47	3.94	181.53	
1983	M6	F	ulna	230	155.97	61.41	4.30		155.97
1983	M12	?	none						
1983	SVI 10a-11a, 0.85	?	none						
1983	SVI 12, 0.90	?	2nd metatarsal		179.63	70.72	6.76	179.63	
1983	SVI 11, 0.65	F	none						
1983	SVI 10a, 0.45	F	radius		154.00	60.63	4.24		154.00
1983	SVI 10, 0.55	?	none						
1984	M16	F	radius	238	167.74	66.04	4.24		167.74
1984	M17	M	femur	460	172.25	67.81	3.94	172.25	
1984	M18	M	tibia	397	178.24	70.18	4.00	178.24	
1984	M19	F	tibia	357	165.06	64.98	3.66		165.06
1984	M23	M	tibia	398	178.25	70.18	4.00	178.25	
1984	M24	M	femur+tibia	495;421	182.44	71.83	3.69	182.44	
1986	M29	M	femur+tibia	461; 384	173.47	68.30	3.69	173.47	
1986	M30	M?	none						
1986	M31	?	none						
1986	M33	M	femur+tibia	480; 417	180.31	70.99	3.69	180.31	
1988	M37	F	femur+tibia	472; 380	171.57	67.55	3.55		171.57
1988	M38	F	tibia	353	163.90	64.53	3.66		163.90
1988	M39	M	femur	470	174.57	68.73	3.94	174.57	
1988	M40	F	humerus+femur+tibia	298; 422; 370	162.31	63.90	3.51		162.31
1991	M42	F	humerus+femur+tibia	316; 439; 355	163.80	64.49	3.51		163.80
1991	M43	M	femur	500	181.53	71.47	3.94	181.53	
1991	M44	M	none						
1991	M45	F	none						
1991	M46 (1)	M	femur	486	178.28	70.19	3.94	178.28	
1991	M46 (2)	M	femur	530	188.49	74.21	3.94	188.49	
1991	M47	M	femur	471	174.80	68.82	3.94	174.80	
1991	M48	M	tibia	416	182.60	71.89	4.00	182.60	
1991	M49	F	humerus+femur+tibia	341; 450; 384	170.12	66.98	3.51		170.12
1991	M50	M	tibia	412	181.63	71.51	4.00	181.63	
1991	M51 (1)	F	femur+tibia	431; 354	162.17	63.85	3.55		162.17
1991	M51 (2)	M	femur+tibia	478; 395	176.54	69.50	3.74	176.54	
1991	M51 (3)	M	tibia	415	182.36	71.80	4.00	182.36	
1991	M51 (4)	F	femur	460	167.72	66.03	3.72		167.72
1992	M52	F	humerus	335	170.53	67.14	4.45		170.53
1992	M54	M	none						
1992	M55	F	tibia	373	169.70	66.81	3.66		169.70
1992	M56	M	tibia	434	186.96	73.61	4.00	186.96	
1995	M95/2	M	none						
1996	M96/1	F	femur+tibia	469; 379	170.99	67.32	3.55		170.99
1996	M96/2	M	femur+tibia	465; 379	173.29	68.23	3.74	173.29	
1996	M96/4	F	none						
1996	M96/7	M	femur+tibia	473; 398	176.30	69.41	3.74	176.30	
1996	M96/8	M	femur+tibia	484; 395	177.29	69.80	3.74	177.29	
1996	M96/9	M	femur+tibia	494; 412	180.67	71.13	3.74	180.67	
1996	M65	M	tibia	430	185.99	73.22	4.00	185.99	
1996	M69	M	tibia	437	187.68	73.89	4.00	187.68	
Average					174.24	68.60		179.78	165.31

Schela Cladovei: Summary of Pathological Lesions

Year	M No or Locus	Age	Sex	Area Affected	Type of disease	Bone	Comments
1965	SB Sq 2 1m	adult	M	shoulder	joint	clavicle right	
				shoulder	trauma	clavicle right	
				thorax	joint	ribs	
				spine	joint	vertebra lumbar	
1967	M1	young adult	F	pelvis	trauma	innominate right & left	
1967	M1 bis (mixed remains)	16-23; adult	F; F	spine	trauma	vertebra thoracic	
				spine	trauma	vertebra lumbar	
1967	Complex Epi (mixed remains)	under 20; middle aged	M; ?	spine	trauma	vertebra thoracic	
				spine	joint	vertebra thoracic	
				spine	joint	vertebra lumbar	
				hands	joint	metacarpal 3rd	
				feet	joint	left talus	
				feet	joint	right talus	
				feet	joint	cuneiform 1st left	
				feet	joint	cuboid left	
				feet	joint	metatarsal left 3rd	
1968	M2	older adult	M	spine	joint	vertebra cervical	
				pelvis	?	innominate right & left	hyperostosis pelvic bones
				feet	joint	calcaneus left	
1868	M3	adult	?	none noted			
1968	M3a	adult	?	skull	trauma	cranium	
1968	Largirea 1	adult	M	thorax	joint	ribs	
				shoulder	joint	scapula right	
				spine	joint	vertebrae	
1968	Largirea 1,55	45+	M	skull	trauma	cranium	perimortem fracture
				skull	trauma	cranium	healed fracture
				skull	?	cranium	pitting external surface
				dentition	dental	mandible/maxilla	
				skull	trauma	mandible	
1968	Schelet ous la vatra (mixed remains)	adult	M; ?	none noted			
1982	M1	older adult	M	shoulder	joint	both scapulae	
				spine	joint	vertebrae	most of spine affected
				upper limbs	joint	both elbows	
				upper limbs	joint	right wrist	
				dentition	periodontal	mandible/maxilla	
1982	M3	adult	F	spine	spina bifida	sacrum	
				pelvis	trauma	right pubis	parturition scars?
				spine	joint	vertebrae	most of spine affected
				lower limbs	joint	both hips	
				lower limbs	infectious	right tibia	2 sinuses & thickening
				lower limbs	joint	left ankle	
				feet	joint	both feet	

Year	M No or Locus	Age	Sex	Area Affected	Type of disease	Bone	Comments
1982	M5	older adult	M	skull	trauma	frontal	healed fracture
				spine	joint	lumbar vertebrae	
				upper limbs	joint	right elbow	
				lower limbs	joint	both hips	
				lower limbs	joint	both knees	
				upper limbs	joint	right wrist	
1983	M6	adult	F	none noted			
1983	M12	adult	?	none noted			
1983	SVI, 10a-11a, 0.85	adult	?	none noted			
1983	SVI, Sq 12, 0.90	young adult	?	feet	joint	2nd metatarsal	
1983	SVI, Sq 11, 0.65	adult	F	none noted			
1983	SVI, Sq 10a, 0.45	adult	F	spine	joint	vertebral facets	
				upper limbs	joint	both elbows	
1983	SVI, Sq 10, 0.55	older adult	?	dentition	dental	M2	caries
1984	M16	c. 18	F	dentition	hypoplasia	canine & 1st premolar	occurring about 5 years
1984	M17	c.21	M	dentition	hypoplasia	teeth	occurring about 1 years
1984	M18	older adult	M	thorax	trauma	ribs	healed fractures 6 right ribs
				spine	trauma	lumbar vertebrae	Schmorl's nodes
				upper limbs	joint	right elbow	
				lower limbs	trauma	both feet	ensethopathic lesions?
				lower limbs	trauma	left knee	ensethopathic lesions?
				hands	joint	both 1st metacarpals	
1984	M19	adult	F	feet	trauma	left 2nd - 5th metatarsals	healed transverse fractures of shafts
				pelvis	trauma	both innominates	parturition scars?
				spine	spina bifida	sacrum	
1984	M23	c.25	M	spine	trauma? disease?	most of spine	scoliosis, kyphosis, lipping of facets, wedging of L1 L5
				shoulder	trauma	both clavicles	ensethopathic lesions at costoclavicular ligaments?
				thorax	trauma	rib shaft	healed fracture
				thorax	trauma	right rib	healed fracture?
				upper limbs	trauma?	distal end right radius	thickening of distal end - infection?
				upper limbs	trauma?	left ulna	ensethopathic lesions?
				lower limbs	joint	left femur	
				lower limbs	trauma	right fibula	ensethopathic lesion?
				hands	joint?	both hands	shafts and joints affected
1984	M24	middle-aged	M	spine	trauma/joint	lower lumbar vertebrae/sacrum	lipping of bodies & facets + Schmorl's nodes
				upper limbs	joint	right elbow	
				lower limbs	trauma	both femurs	ensethopathic lesions
				hands	trauma	1st metacarpal/triquetral	healed fracture with secondary arthritis
				feet	joint	3rd metacarpo-phalangeal joint	
1986	M29	middle-aged	M	thorax	trauma	left 3rd rib	healed fracture
				thorax	joint	ribs	costovertebral joints
				spine	joint	most of spine	
				spine	trauma	T8 T9	Schmorl's nodes
				lower limbs	joint	left knee	femur, tibia & patella involved
				lower limbs	joint	both ankles	
				feet	joint	both feet	several bones affected

Schela Cladovei: Summary of Pathological Lesions

Year	M No or Locus	Age	Sex	Area Affected	Type of disease	Bone	Comments
1986	M30	adult	M?	none noted			
1986	M31	adult	?	skull	trauma	cranium	heal skull fracture
1986	M33	50+	M	thorax	joint	left ribs	
				spine	joint	thoracic & lumbar spine	
				lower limbs	trauma	left femur	healed fracture with loss of height & infection
				feet	joint	both feet	
1986	M33	foetus/ neonate		skull	metabolic?	cranium	pitting external surface/ erosive lesions internal surface
				skull	metabolic?	orbits	abnormal growth both orbits
1988	M37	older adult	F	thorax	joint	ribs	
				spine	joint	vertebrae	
				lower limbs	joint	innominates & both femurs	
				lower limbs	joint	right ankle	
				feet	trauma	right 5th metatarsal	
1988	M38	45+	F	dentition	caries/abscess	left upper M1	
				spine	joint	most of spine	
				thorax	joint	ribs	
				shoulder	joint	right humerus	
				lower limbs	joint	both ankles	
				feet	joint	left 1st & 2nd metatarsals	
1988	M38	foetus/ neonate		none noted			
1989	M39 (1)	25-35	M	spine	trauma	6th thoracic vertebra	embedded projectile
				pelvis	trauma	left innominate	embedded projectile
				upper limbs	joint	both elbows	
				spine	joint	thoracic & lumbar spine	
1989	M39 (2)	foetus/ neonate		none noted			
1989	M39a	foetus/ neonate		none noted			
1989	M40	15-18	F	upper limbs	trauma	left humerus	embedded projectile
				spine	trauma	3rd lumbar vertebra	impaction injury
1991	M42	45+	F	skull	trauma	occipital	healed fracture
				skull	joint	right temporomandibular joint	
				dentition	periodontal	mandible/maxilla	
				spine	joint	most of spine	
				thorax	joint	ribs	
				upper limbs	joint	both shoulders	
				upper limbs	joint	both elbows	
				feet	trauma	1st proximal phalanx	2 healed fractures on same bone
1991	M43	25-30	M	spine	trauma	12th thoracic vertebra	healed fracture with kyphoscoliosis + malalignment of various vertebrae
				feet	joint	right foot	
1991	M44	adult	M	dentition	periodontal	maxilla	
1991	M45	young adult	F	none noted			
1991	M46	35-39	M	dentition	periodontal	mandible/maxilla	
				spine	?	axis/3rd cervical vertebra	partial fusion
				spine	joint	most of spine	associated with fusion at neck?
				upper limbs	trauma	left radius/ulna	malunited fractures

Schela Cladovei: Summary of Pathological Lesions

Year	M No or Locus	Age	Sex	Area Affected	Type of disease	Bone	Comments
1991	M47	25-26	M	spine	trauma	thoracic vertebra	embedded projectile
				spine	trauma	thoracic vertebra	embedded projectile
				spine	trauma	left ulna	mid-shaft fracture
				lower limbs	trauma	left fibula	ligamentous damage?
1991	M48	25-30	M	none noted			
1991	M49	35-45	F	dentition	periodontal	mandible/maxilla	
				spine	joint	most of spine	
				upper limbs	joint	both shoulders	
				upper limbs	trauma	right ulna	un-united fracture lower third
				upper limbs	trauma	right elbow	secondary arthritis
				lower limbs	joint	both knees	
				feet	trauma	left 5th metatarsal	with secondary arthritis?
1991	M50	35-45	M	spine	trauma	lower thoracic vertebra	embedded projectile
				upper limbs	trauma	right ulna	un-united fracture lower third with infection
				lower limbs	trauma	right fibula	un-united fracture lower 1/4, tibia not involved
				feet	joint	both feet	
1991	M51	adult	F	none noted			
1991	M51	50+	M	none noted			
1991	M51	adult	M	lower limbs	trauma	right fibula	healed fracture distal 1/3
				lower limbs	trauma?	right fibula	secondary distal arthritis?
1991	M51	adult	F	upper limbs	trauma	left radius	healed Colles fracture
				upper limbs	trauma?	left wrist	secondary arthritis?
				upper limbs	joint	right wrist	
				pelvis	trauma?	left innominate	trauma? ensethopathic lesion?
1992	M52	40+	F	upper limbs	joint	right shoulder	left missing
				lower limbs	joint	right hip	left missing
1992	M54	adult	M	spine	trauma	lower thoracic vertebra	several Schmorl's nodes
				spine	trauma	thoracic vertebra	projectile damage?
1992	M55	16-17	F	none noted			
1992	M56	adult	M	lower limbs	?	left tibia	non-specific area of reactive growth mid-shaft
1995	M95-1	neonate to 6 months	?	none noted			
1995	M95-2	35-45	M	skull	trauma	left frontal	perimortem fracture
				upper limbs	trauma	left clavicle	embedded flint
				spine	trauma	1st thoracic vertebra	embedded flint
				shoulder	trauma	right scapula	perimortem fracture
				upper limbs	trauma	right humerus	embedded projectile
				pelvis	trauma	left innominate	two projectile injuries (one still embedded)
				lower limbs	trauma	left femur	depression in head related to above
				lower limbs	trauma	right femur	cut' on gluteal tuberosity - associated with above trauma?
1995	M95-3	foetus/ neonate	?	none noted			
1996	M96-1	c.20	F	spine	spina bifida	sacrum	
1996	M96-2	25-30	M	upper limbs	trauma	right shoulder	dislocation of acromioclaviciuar joint
				spine	?	neck & lower thoracic/lumbar spine	asymmetry of C7 T1 & lower spine
1996	M96-3	5-7	?	none noted			
1996	M96-4	middle-aged	F	spine	joint	neck	
				spine	trauma	lumbar vertebrae	Schmorl's nodes
				lower limbs	joint	left hip	
1996	M96-5	5 months	?	skull	?	external surface cranium, right orbit, right malar	platelets of laid down bone with pitting

Schela Cladovei: Summary of Pathological Lesions

Year	M No or Locus	Age	Sex	Area Affected	Type of disease	Bone	Comments
1996	M96-6	foetus/ neonate	?	none noted			
1996	M96/7	adult	M	spine	joint	lumbar spine	
				thorax	joint	ribs	
				lower limbs	joint	both knees	
				feet	joint?	middle & terminal phalanges	pathological fusion with lipping
1996	M96/8	c.35	M	skull	infectious	maxillary sinuses	
				skull	?	cranium	external pitting superior part frontal and parietals
				spine	joint	neck & lower thoracic/lumbar spine	
				thorax	joint	ribs	
				thorax	?	2 right ribs	thickening & pitting on external & internal surfaces
				thorax	trauma	right rib	healed fracture
				thorax	trauma	left ribs	healed fracture
				thorax	?	3 lower left ribs	periosteal reaction on external & internal surfaces
				upper limbs	trauma	right clavicle	dislocation of acromioclaviciuar joint?
				upper limbs	joint	both elbows	humeri, ulnar & radii involvement
				hands	joint	left 1st metacarpo-phalangeal joint/ and other phalanges	
				lower limbs	joint	right knee	
				feet	trauma	both feet	ligament damage - result of a fall landing on the feet
				feet	joint	both feet	
				feet	trauma	right 1st terminal phalanx	healed fracture with joint involvement
1996	M96/9	adult	M	none noted			
1996	M65	50+	M	upper limbs	joint	right elbow	
				spine	trauma	lumbar spine	Schmorl's node
				feet	joint	left 5th metatarsal	
1996	M69	adult	M	lower limbs	trauma	left femur	healed mid-shaft fracture with mal-union - loss of height of 17 mm with infection

Schela Cladovei: Summary of Dentition

Year	M No.	Maxilla	Mandible	No. Places	AM Loss	PM Loss	Missing?	Abscess	Caries	Periodontitis	Age	Hypoplasia	Comments
1967	Complex Epi	no	yes	8	no	6	no	no	no	no	?	no	
1968	M2	no	yes	8	no	1	no	no	no	no	?	no	
1968	M3	yes	yes	32	no	no	no	no	no	no	25-35	no	
1968	M3a	yes	yes	8	no	no	no	no	no	no	?	no	
1968	Ous la Vatra	no	yes	8	no	1	no	no	no	no	25-35	no	
1968	Complex Epi	yes	no	6	no	4	no	no	no	no	?	no	
1968	Largirea 1,55	yes	yes	32	no	yes	2	yes	no	yes	45+	no	
1982	M1	yes	yes	32	no	4	no	no	no	yes	45+	no	
1983	M12	no	yes	16	no	6	no	no	no	no	25-35	no	
1983	SVI; Sq11; 0.65	no	yes	9	no	6	no	no	no	no	25-35	no	
1983	SVI; Sq10; 0.55	no	yes	6	no	3	no	no	yes	yes	45+	no	
1984	M16	no	yes		no		no	no	no	no	c. 6	yes	dentition developing
1984	M17	yes	yes	32	no	no	1	no	1 (occlusal)	no	17-25	yes	
1984	M23	yes	yes	32	no	no	no	no	no	no	17-25	no	
1986	M29	yes	yes	32	no	no	no	no	no	no	25-35	no	
1986	M30	yes	no	16	no	no	no	no	no	no	25-35	no	
1986	M33	yes	yes	32	no	no	no	no	no	no	35-45	no	
1988	M37	yes	no	16	no	3	no	no	no	no	45+	no	
1988	M38	yes	yes	32	no	no	no	no	1 (contact)	no	45+	no	abscess associated with caries
1989	M39	yes	yes	32	no	2	no	no	no	no	25-35	no	
1989	M40	yes	yes	32	no	no	no	no	no	no	18-21	no	
1991	M42	yes	yes	32	no	1	no	no	no	no	45+	no	
1991	M43	yes	yes	32	no	no	no	no	no	no	25-35	no	
1991	M44	yes	no	16	no	4	no	no	no	yes	35-45	no	
1991	M45	yes	no	14	no	4	no	no	no	no	17-25	no	
1991	M46	yes	yes	32	M3?	no	?	yes	no	yes	45+	no	associated with attrition
1991	M48	yes	yes	32	no	no	no	no	no	no	17-25	no	
1991	M49	yes	yes	32	no	no	no	yes	no	yes	35-45	no	associated with periodontal disease
1991	M50	no	yes	16	no	1	no	no	no	no	25-35	no	
1995	M95/2	yes	yes	32	no	4	M3?	no	no	no	35-45	no	
1996	M96/2	yes	yes	24	no	3	no	no	no	no	17-25	?	
1996	M96/8	yes	yes	32	no	no	no	no	no	no	35-45	no	
				715		53							

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
frontal	L/C	brow ridge & upper orbit	1	))	adult	size	M	very large brow ridge, rounded orbit edge			3 adjoining fragments
frontal	C	brow ridge	1	)	adult	size	M	very large brow ridge			
frontal	C	brow ridge	1	)	?		?				
frontal	R	outer orbit	3	)	?		?				
frontal	R	upper orbit	1	)	child?	size				pitting in orbit, probably pathological	
frontal	R	upper orbit	1	) 8	?		?				
frontal	L	upper orbit	1	)	infant	size				slight pitting in orbit	
frontal	L	upper orbit	1	)	child	size				deep pits in orbit	
frontal	L	upper orbit	1	)	child	size					
frontal		general fragments	3	)							
nasal bone		upper area	2								
vomer		alcp	2								
malar	R	various	11	)	various						
malar	L	various	8	) 11	various						
zygomatic process	?	fragments	11								
petrous part temporal	R	various	12	)							
petrous part temporal	L	various	11	)							
petrous part temporal	?	fragments	24	) 13							
petrous part/mastoid	R	alcp	1	))	?		F?	small mastoid process			probably F but could be immature; ear ossicle
temporal/mastoid area	R	fragment mastoid area	1		adult	size	M	large mastoid process			
temporal/mastoid area	?	fragments various sizes	36								
occipital		fragments various sizes	13		various						
occipital-basilar part		fragments various sizes	19		various						
parietal	?	fragment	1		child?	thickness				slight pitting external surface	
parietal	?	fragment	1		child?	thickness, unfused suture				slight pitting external surface	
cranium		fragments, various sizes	665		various						various degrees of
cranium		fragments, various sizes	62		children	thickness					clearly immature, various degrees of
maxilla/palate		fragments, various sizes	18	)							
maxilla		small fragments	3	) 2							see separate
maxilla		small undiagnostic fragments	10	)							sockets but not clear
mandible	?	fragments, various sizes	20	)							see separate
mandible	?	fragments, various sizes	55	) 9							undiagnostic fragments
loose teeth	?	complete or alcp	16								see special
loose teeth	?	undiagnostic fragments	58								fragments roots &
ribs	?	fragments	395		various						includes some very
atlas		arch with facet for dens	2	)							
atlas		facets	4	)							
axis		alcp	1	)							
axis		alcp, dens missing	1	)							
axis		dens only	1	)							
axis		dens only	1	)						lipping, destruction	
CV		mostly bodies only	10	)	all adult	epiphyseal rings fused				1 with lipping	
TV		mostly bodies only	5	)	?						poor condition
LV		bodies only	3	) 4	?						poor condition
LV		body, part arch	1	)	+7	body fused to arch					
VT		fragments bodies	6	)							poor condition
VT		miscellaneous fragments	318	)	various						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
VT		miscellaneous fragments	19	)	foetal?	components unfused					tiny, probably foetal
sacrum		fragment immature 1st body	1	)	child						
sacrum		fragments bodies	6	)							
coccyx		alcp	4	)							
scapula	R	glenoid, part coracoid	1	)	under 18	glenoid epiphysis unfused			25 mm (est.)		
scapula	R	glenoid	1	)	+18	glenoid epiphysis fused	M	length glenoid	37		
scapula	R	glenoid, part acromion	1	)	+18	glenoid epiphysis fused	F	length glenoid	31 (est.)		slight damage to
scapula	R	fragment glenoid	1	)	+18	glenoid epiphysis fused					
scapula	R	fragment glenoid	1	)	+18	glenoid epiphysis fused	?				
scapula	L	glenoid	1	) 8	+18	glenoid epiphysis fused	F	length glenoid	30		
scapula	L	glenoid	1	)	+18	glenoid epiphysis fused	?				glenoid damaged, not
scapula	?	fragments glenoid	3	)							
scapula	L	coracoid process	1	)	+18	coracoid unfused					
scapula	?	fragments coracoid process	13	)							
scapula	?	fragments acromion	18	)							
scapula	?	fragments body	20	)							
clavicle	L	acromial 1/2	1	)	adult	size					
clavicle	?	part acromial end	1	)							
clavicle	L	acromial 2/3	1	)	c.2 ?	size			est. full length 60 mm		
clavicle	L	acromial 1/3	1	) 7	c.2 ?	size			est. full length 60 mm		
clavicle	R	part shaft	3	)	?						
clavicle	?	part shafts	15	)	various						
humerus	L	proximal 1/4	1	)	child						
humerus	?	fragments head	3	)							
humerus	?	fragments shaft	3	) 3							
humerus	?	fragments distal end	9	)							
radius	?	fragments proximal end	11	)		various					
radius	?	heads	6	)							
radius	?	shafts	18	)							
radius	?	shaft	1	) 8	child	size					gnaw marks on shaft
radius	?	fragment distal shaft	1	)	child (c 5?)						
radius	?	fragment distal epiphysis	1	)							
ulna	R	proximal end	3	)	adult?	size					
ulna	R	proximal 2/3	1	)	foetal	estimated length			length c. 50 mm		
ulna	R	proximal 1/3	1	)	foetal	estimated length			est. length 55 mm		
ulna	R	proximal 1/2	1	)	neonate?	estimated length			length c. 64 mm		
ulna	L	fragment semilunar notch	3	) 8	adult?	size					
ulna	L	proximal 1/2	1	)	c.4	estimated length			est. length 120 mm		
ulna	?	fragment proximal end	1	)							
ulna	?	fragments semilunar notch	2	)							
ulna	?	unfused distal epiphysis	1	)	older child	epiphyseal fusion					
ulna	?	shaft fragments	16	)							
pisiform	?	complete	4	)							
triquetral	L	complete	2	)							
lunate	L	alcp	3	)							
lunate	R	complete	4	)							L & R lunates from 6
scaphoid	L	alcp	1	)							
scaphoid	R	complete	4	)							
hamate	L	complete	5	)							
hamate	R	complete	4	)							

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
capitate	L	complete	4	)							
capitate	R	complete	5	) 8							
lesser multanglar	L	complete or alcp	3	)							
lesser multanglar	R	complete or alcp	8	)							
greater multanglar	L	complete	4	)							
1st metacarpal	R	complete	1	)	+15	epiphyses fused			42.70		
1st metacarpal	R	fragments	4	))						1 with punched out lesion proximal margin head, palmar surface	
1st metacarpal	L	fragment	1	)							
2nd metacarpal	R	complete	1	)	+15	epiphysis fused			65.11		
2nd metacarpal	R	head missing	1	)							
3rd metacarpal	R	complete	1	)	+15	epiphysis fused			64.79		
3rd metacarpal	R	head missing	1	)							
3rd metacarpal	L	head missing	2	)							
4th metacarpal	R	complete	1	)	+15	epiphyses fused			54.62		
4th metacarpal	R	head missing	1	)							
4th metacarpal	L	head missing	1	)							
5th metacarpals	R	head missing	2	)							
metacarpals	?	fragments, mostly shafts	49	)							
proximal phalanges	?	complete or alcp	29	)	+15	epiphyses fused					
middle phalanges	?	all complete	25	)	+15	epiphyses fused					
terminal phalanges	?	mostly complete	23	)	+15	epiphyses fused					
phalanges	?	fragments	52	)							
ilium	?	sciatic notch	3	)			?	undiagnostic			
innominate	?	acetabulum	14	)							undiagnostic
ilium	?	iliac crest	8	)	+20	epiphyseal fusion					
ilium	?	iliac crest	3	) 2	under 20	crest unfused					
ilium	?	ilium	32	)							undiagnostic
innominate	?	ischio-pubic ramus	4	)							undiagnostic
pubis	?	pubic symphysis	1	))	older adult	morphology surface	?	fragment too small			surface flattened, clear rim but very small
femur	R	fragment with greater trochanter	2	))							
femur	R	neck	1	) 3	under 18 (c.10?)	head unfused					
femur	?	fragment head	5	)							none measurable
femur	?	fragments distal end	8	)							
femur	?	fragments shaft	28	)							
patella	L	complete	1	)					39x33		
patella	L	complete	1	)					33x33		
patella	L	alcp	1	)					36x?		
patella	L	fragments	2	) 4							
patella	R	1 alcp, 1 fragment	2	)							
patella	?	fragments	2	)							
tibia	R	distal 1/3	1		18+	distal epiphysis fused	?				
tibia	L	fragments distal end	2		18+	distal epiphysis fused					
tibia	?	fragment plateau	1								
tibia	?	fragments proximal epiphyses	2		under 20	unfused					
tibia	?	fragments shaft	15		various						
fibula	L	fragment distal end	1	)	16+	epiphyseal fusion					

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
fibula	R	fragments distal end	2	) 3	16+	epiphyseal fusion					
fibula	?	shaft fragments	17	)							
calcaneus	?	small fragments	4	)							
talus	R	alcp	1	)							
talus	?	fragment	1	)							
cuboid	R	alcp	2	)							
navicular	L	complete or alcp	5	)							
navicular	?	fragments	3	)							
1st cuneiform	R	complete	3	)							
1st cuneiform	L	complete	3	)							
2nd cuneiform	R	alcp	2	)							
2nd cuneiform	L	alcp	1	)							
3rd cuneiform	?	fragment	1	)							
tarsal bones	?	fragments	12	)							
1st metatarsal	?	fragments	4	)							
4th metatarsal	R	alcp	1	) 5	15+	epiphysis fused					
4th metatarsal	R	fragment	1	)							
5th metatarsal	L	proximal 1/2	1	)							
metatarsals	?	fragments	62	)							
1st proximal phalanx	?	complete	4	)							
1st proximal phalanx	?	fragments	3	)							
proximal phalanges	?	complete or alcp	15	)	15+	all epiphyses fused					
proximal phalanx	?	complete	1	)	15+	epiphysis fused				# proximal end, involves articular surface	
phalanges	?	articular end missing	6	)							probably proximal
middle phalanges	?	complete	6	)	15+	all epiphyses fused					
1st terminal phalanges	?	almost complete	4	)							
terminal phalanges	?	complete	3	)	15+	all epiphyses fused					
Total Identified Fragments			2574								

Tomb N, Hili Gardens: Section 1 Level 4

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
frontal	L	part orbit	1	1	child	size					
parietal	?	small fragment	1		child	thickness				moderate pitting external surface	
temporal	R	part petrous part	2	)							
temporal	L	part petrous part	2	)							
temporal	?	part petrous part	8	) 2							very eroded - undiagnostic
temporal	?	zygomatic process	5	)							
malar	R	superior part	1	)							
malar	L	superior part	1	) 2							
nasal bone		fragment	1								
cranium		small fragments	264		various	thickness					
cranium		small fragments	38		very young children	thickness					clearly from very young children
cranium		small fragments	3		children	thickness				fine pitting external surface	
maxilla	?	small fragments	2		?						sockets but unclear which teeth
maxilla	R	fragment anterior part	1	)	adult						see dentition spresdsheet
maxilla	L	fragment anterior part	1	) 2							see dentition spresdsheet
mandible	?	small fragments	11	)							undiagnostic fragments, no sockets
mandible	?	fragments	2	) 2	young children	crypts for unerupted teeth					unclear which teeth
mandible	R	fragment internal surface	1	)	?						sockets but unclear which teeth
loose teeth	R	lower right canine	1								see dentition spresdsheet
loose teeth	?	fragments	9								
ribs	?	fragments	111		various						
ribs	?	various, mostly shaft, fragments	54		children, various ages	size					immature, some probably foetal/neonate
atlas		fragment with facet for dens	1	)							
axis		detached dens	3	)	adults	fused					
CV		alcp	1	)	25+	epiphyseal ring fused					
CV		body only	1	)	7-25	epiphyseal ring unfused					
CV		fragments body	5	) 3	25+						
TV		fragment body	1	)	25+	epiphyseal ring fused					
VT		small fragments bodies	13	)	25+	epiphyseal ring fused					
VT		processes	149	)							

Tomb N, Hili Gardens: Section 1 Level 4

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
VT		processes	28	)	under 3	arches unfused					
VT		bodies	2	)	under 3	arches unfused to bodies					
sacrum		small fragments bodies	6	)							
clavicle	L	fragment acromial end	1	)	adult?	size					
clavicle	R	fragment acromial end	1	)	foetal?	estimated length			40		
clavicle	R	fragment acromial end	1	) 3	infant aged c.4?	relative size					
clavicle	?	fragments shaft	2	)							
scapula	?	fragments glenoid	2	)	?						
scapula	?	small fragments body	2	) 1							
humerus	?	small fragments distal end	2	)	adult?	size					
humerus	L	proximal 1/2	1	) 2	neonate-6 months	estimated length			estimated full length 74		
radius	?	shaft fragments	3	)	immature	size					
radius	?	unfused heads	2	) 2	under 17	epiphyses unfused					
radius	?	unfused distal ends	2	)	under 18	epiphyses unfused					
ulna	L	fragment proximal end	1	)	infant	size					
ulna	?	fragments proximal end	3	) 2	?						
ulna	?	fragment shaft	2	)	adult?	size					
pisiform	?	complete or alcp	6	)							
triquetral	R	complete	3	)							
triquetral	L	complete	2	)							
lunate	R	complete	4	)							
lunate	L	complete or alcp	5	)							
lunate	?	fragment	1	)							
scaphoid	R	complete or alcp	5	)							
scaphoid	L	complete	2	)							
scaphoid	?	fragments	3	)							
hamate	R	complete	1	)							
hamate	L	complete	1	)							
hamate	?	fragments hook	3	)							
capitate	R	complete	1	)							
capitate	L	complete	2	)							
lesser multanglar	R	complete	3	)							
lesser multanglar	L	complete	3	) 5							
greater multanglar	L	complete	3	)							

Tomb N, Hili Gardens: Section 1 Level 4

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
carpal bones	?	fragments or immature	11	)							some too immature to identify
1st metacarpal	R	alcp	1	)	15+	epiphysis fused					
2nd metacarpal	?	unfused distal epiphysis	1	)	under 15	epiphysis unfused					
metacarpal shafts	?	shaft fragments	18	)	various						
proximal phalanges	?	complete & alcp	7	)	various						
proximal phalanx	?	head missing	1	)	under 15	epiphysis unfused					
middle phalanges	?	complete & alcp	22	)	15+	epiphysis fused					
1st terminal phalanx	?	complete	1	)	15+	epiphysis fused					
terminal phalanges	?	complete & alcp	16	)							
phalanges	?	fragments	37	)							
ilium	?	fragments sciatic notch	2	)			?	too small to estimate sex			
ilium	?	small fragments ilium	19	) 2							
ischium	R	small fragment	1	)	infant?	size					
femur	?	small fragments condyles	3								
patella	?	small fragment	1								
tibia	?	fragment tibial plateau	1								state of epiphyseal fusion unclear
tibia	?	small fragment shaft	1		?						state of epiphyseal fusion unclear
tibia	L	proximal 1/4	1		c. 1 year	length			approx. full length 100		
fibula	?	fragments shafts	7	) 4	children	size					all appear immature, some very young
navicular	R	complete	1	)							
navicular	R	fragments	2	)							
navicular	L	fragments	3	)							
1st cuneiform	?	fragment	1	)							
2nd cuneiform	R	complete	1	)							
2nd cuneiform	L	complete	1	)							
tarsal bones	?	fragments	4	)							
1st metatarsal	?	fragment base	1	)							
1st metatarsal	?	fragments head	2	)							
metatarsals	?	fragments	14	)							
proximal phalanges	?	complete or alcp	19	) 3	15+	epiphyses fused					
proximal phalanx	?	complete	1	)	15+	epiphyses fused				healed # shaft	

Tomb N, Hili Gardens: Section 1 Level 4

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
proximal phalanx	?	unfused epiphysis	1	)	under 15	epiphyses unfused					
middle phalanges	?	complete	7	)	15+	epiphyses fused					
middle phalanx	?	complete	1	)	under 15	epiphyses unfused					
1st terminal phalanges	?	complete or alcp	2	)	15+	epiphyses fused					
1st terminal phalanx	?	fragment	1	)							
terminal phalanx	?	complete	1	)	15+	epiphyses fused					
middle & terminal phalanges	?	complete	1	)	15+	epiphyses fused				phalanges fused together	
Total Identified Fragments			1018								

Tomb N, Hili Gardens: Section 2 Level 3/4

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal	L/R	almost complete	1	)	adult?	skull thickness	M?					
frontal	L/R	L orbit missing	1	)	?		M	brow ridge				uneven profile - probably due to burning
frontal	R	orbit	1	)	child?	skull thickness					pitting in orbit	
frontal	R	orbit	1	)	child?	skull thickness					pitting in orbit	
frontal	R	orbit only	1	)	adult?	size						
frontal	R	orbit & brow ridge	1	)	adult?	size	M	brow ridge				
frontal	R	upper orbit	12	)	mixed							
frontal	R	right side orbit	1	)	adult	thickness					pitting & irregular growth in orbit	most of orbit missing
frontal	R	upper edge orbit	1	)	child	thickness					area of raised growth surrounded by pitting	
frontal	L	upper edge orbit	11	)	adult?	thickness						
frontal	L	upper edge orbit	1	)	adult?	thickness					slight pitting in orbit	
frontal	L	part orbit & superior temporal line	1	)	adult?	thickness					pitting & growth in orbit	
frontal	L	almost complete orbit & edge	1	)	very immature	length orbit					slight pitting, may be pathological	
frontal	L	orbit only	1	)	?							
frontal	L	orbit only	1	)	?						slight pitting visible	
frontal	L	orbit only	1	)	immature	size					slight pitting in orbit	
frontal	C	central brow ridge	4	)	mixed	thickness						
frontal	C	central brow ridge	5	)								
frontal	R	with part coronal suture & part orbit	1	) 35	?		F?	orbit edge				
frontal	R	with frontozygomatic suture, part sphenoid & orbit	1	)	adult	sphenoid fused	M?	orbit edge, brow ridge				
frontal	R	with frontozygomatic suture, superior temporal line & orbit	1	)	adult	size	M?	orbit edge				
frontal	R	small with part orbit	5	)								
frontal	R	orbit with frontozygomatic suture	4	)	child	fine bone					slight pitting	
frontal	R	part orbit	1	)	child	fine bone, size						
frontal	C	brow ridge, nasion	2	)	?							
frontal	C	brow ridge, nasion	1	)	infant	size						
frontal	L	STL, frontozygomatic suture, coronal suture, & part orbit	1	)	?		?				fine pitting in orbit	
frontal	L	fragment with superior temporal line, frontozygomatic suture, frontal + orbit	2	)	infant	fine bone, size	?					
frontal	L	fragment with superior temporal line, frontozygomatic suture, frontal + orbit	2	)	probably adult	size						
frontal	L	upper orbit	6	)	?		?					
frontal	L	upper orbit	2	)	child	fine bone, size						
frontal	?	part orbit	1	)	child	size					slight pitting in orbit	
frontal	?	part orbit	12	)							1 with fine pitting & reactive growth	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal	L	part orbit	1	)	child	size					marked pitting & reactive growth in orbit	
frontal	?	part orbit	1	)	?		?					
occipital		fragments	57		various							
occipital		fragment with central part	1								lump 15 x 20 mm external surface, some pitting external occipital crest + 3 large pits internal crest	
occipital		fragment with central part	1								similar lump to above, but no associated pitting	
occipital		fragment basilar part	2									
temporal	L	petrous part	63	)								
temporal	R	petrous part	48	)								
temporal	?	petrous part	11	) 69								NB. min. no. from all petrous parts - 69
temporal	?	petrous part	10	)								
temporal	mixed	fragments	103	)								
temporal	mixed	fragments	13	)								
malar	L	various	33	)								
malar	R	various	25	) 33								
malar		fragments	6	)								
zygomatic process	?	fragments	2		?		?					
zygomatic process	?	fragments	10									
cranium	mixed	fragments	573		various						3 fragments with fine pitting on external surface; 2 fragments parietal of exceptional thickness - 1 is 11.92 mm - inner & outer tables appear very thick, diploe appears normal; the other 10.37 mm is the same	
cranium		fragments	1794									
cranium		fragments	5								fine pitting on external surface	
cranium		fragments	665									
hyoid		bodies	5									
hyoid		greater horn	1									
hyoid		greater horn	1									
mandible	R	part alveolus	3	)								see dentition spreadsheet
mandible		alveolar fragments	10	)								with sockets but unclear which teeth
mandible		undiagnostic fragments	16	)								
mandible		part alveolus	1	) 35								see dentition spreadsheet
mandible	L	fragments alveolus	2	)								
mandible	R	fragment	1	)								alveolar part damaged
mandible		fragments	8	)								
maxilla	?	fragment	2	)							marked pitting & irregular growth on palatal surface	
maxilla	L	part alveolus	2	)								see dentition spreadsheet

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
maxilla	R	part alveolus	3	)								see dentition spreadsheet
maxilla		fragments with sockets/crypts	4	) 20								too small to identify which teeth
maxilla		fragments	28	)								general maxilla fragments, no sockets
maxilla		alveolar fragment	10	)								
loose teeth		various	38									see dentition spreadsheet
loose teeth		various	21									see dentition spreadsheet
atlas		various	50	)	?	fusion of parts					facet with lump in spinal column + pitting inferior art facet, groove across lamina, arches not fused but	
atlas		various	16	)	under 3	elements unfused						
atlas		fragments	2	)	under 3	elements unfused						
atlas		fragment with facet for dens	2	)								
atlas		fragments	8	)								some very immature
axis		complete or almost complete	31	)	16 individuals +7, 2 -7	fusion of dens					2 dens with lipping, 1 with slight lipping inferior art process, 1 with asymmetrical formation of lamina + partial fusion of part of arch	
axis		dens only	4	)								
axis		part body	1	)	immature	dens unfused to body						
axis		unfused body	2	)	under 3	dens & arch unfused						
CV		complete or almost complete	83	)	25+	ring fused					3 with lipping around both edges of body; one with lipping on inferior edge, one with lipping on L superior articular facet	38 vertebrae represented, 25 with epiphyseal ring fused, 7 immature vertebrae articulate
CV		bodies	3	)	under 25	body surface billowed						
CV		part bodies	12	)	25+	epiphyseal ring fused						
CV		part body	1	)	under 25	epiphyseal ring unfused						
TV		transverse processes	24	)							2 with lipping in costal facet	
TV		complete or almost complete	7	)	c.7	partial fusion of body to arch						
TV		complete or almost complete	5	)	c.8	body just fused to arch						
TV		complete or almost complete	7	)	under 25	epiphyseal rings unfused						
TV		complete or almost complete	1	)	c.25	epiphyseal ring fusing						
TV		complete or almost complete	112	)	25+	epiphyseal ring fused						
TV		complete or almost complete	6	)	25+	epiphyseal ring fused					osteophytes under lamina	
TV		complete or almost complete	11	)	25+	epiphyseal ring fused					lipping around both edges body	
TV		complete or almost complete	3	)	25+	epiphyseal ring fused					lipping around inferior edge body	
TV		complete or almost complete	4	)	25+	epiphyseal ring fused					pitting, lipping or eburnation facets	
TV		complete or almost complete	2	)	25+	epiphyseal ring fused					pitting, lipping facets + lipping around body	
TV		complete or almost complete	1	)	25+	epiphyseal ring fused					loss anterior height body = #?	
TV		almost complete	1	)	25+	epiphyseal ring fused					spine skewed to L with pitting right articular process	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
TV		almost complete	1	)	25+	epiphyseal ring fused					spine skewed to right, L facets pitted & lipped	
TV		almost complete	2	)	25+	epiphyseal ring fused					2 fused vertebrae, loss height L side, fusion more complete L side, much pathological change.	
TV		part bodies	2	)	25+	epiphyseal ring fused						
TV		part bodies	3	)	25+	epiphyseal ring fused						
LV		complete or almost complete	3	)	c.8	body just fused to arch						
LV		complete or almost complete	24	)	under 25	billowed bodies						
LV		complete or almost complete	2	)	c.25	epiphyseal ring forming						
LV		complete or almost complete	40	)	25+	epiphyseal ring fused						
LV		almost complete	1	)	25+	epiphyseal ring fused					lipping around body edges & inferior facets, the whole vertebra is skewed to right	
LV		almost complete	1	)	25+	epiphyseal ring fused					osteophytes under lamina, lipping inferior body edge	
LV		almost complete	15	)	25+	epiphyseal ring fused					lipping around body edges	
LV		almost complete	2	)	25+	epiphyseal ring fused					lipping, pitting on facets	
LV		posterior part only	1	)	25+	epiphyseal ring fused					osteophytes under lamina, pitting, lipping around facets	
LV		almost complete	1	)	25+	epiphyseal ring fused					moderate loss anterior body height, severe lipping around body, osteophytes under lamina	
LV		almost complete	1	)	25+	epiphyseal ring fused					slight loss body height on left, slight lipping around body	
LV		body	1	)	25+	epiphyseal ring fused					massive lipping around body, extends 12 mm	
LV		body only	14	)	c.7	bodies just fused to arches						
LV		body only	7	)	under 25	epiphyseal ring unfused						
LV		body only	50	)	25+	epiphyseal ring fused						
LV		body only	2	)	25+	epiphyseal ring fused					slight lipping around body edges	
LV		body only	3	)	25+	epiphyseal ring fused					moderate lipping around body edges	
LV		body	1	)	under 25	epiphyseal ring unfused						
VT		miscellaneous	53	)							16 fragments with pitting on facets, 2 with osteophytes under lamina	
VT		fragments bodies	25	)	25+	epiphyseal ring fused					2 fragments with moderate lipping around body	
VT		bodies	3	)	c.25	epiphyseal ring fusing						
VT		body fragments	2	)	under 25	epiphyseal ring unfused						
VT		bodies	48	)	under 7	bodies unfused to arches						
VT		bodies	48	)	25+	epiphyseal ring fused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
VT		body	2	)	under 25	epiphyseal ring unfused						
VT		part bodies	6	) 32	under 25	epiphyseal ring unfused						
VT		part bodies	7	)	under 7	bodies unfused to arches						
VT		part body	2	)	c.7	bodies fusing to arches						
VT		facets/arches/processes	21	)	under 3	arches unfused						
VT		facets/arches/processes	362	)								
VT		arches	62	)	under 7	bodies unfused to arches						
VT		arches	43	)	under 3	part of arches unfused						
sacrum		1st body	18	)	25+	lumbar epiphyseal ring fused						
sacrum		1st body	1	)	under 25	epiphyseal ring unfused						
sacrum		2nd to 5th bodies	23	)								
sacrum		2nd body?	1	)	under 25	body unfused						
sacrum		2nd to 5th bodies	7	)								
sacrum		miscellaneous	14	)								
coccyx		1st vertebrae	8	)								
ribs		fragments with heads and/or tubercles	363	13	various						1 with pitting of facet at tubercle	
ribs		with sternal ends	58									
ribs	R	shaft fragment	1								external surface but large bony mass over site of break on internal surface - no displacement	
ribs		shaft fragments	4								probable shaft #s	
ribs		fragments with heads and/or tubercles	10									
ribs		with sternal ends	10									
ribs		shaft fragments	431									
ribs		shaft fragments	6		immature	size						
ribs		sternal end	2		immature	size						
clavicle	R	almost complete	1	)	c.19	epiphysis partly fused	?	length clavicle	circumference. 3.5			
clavicle	R	complete	1	)	7-8 years	length			circumference. 2.1			
clavicle	L	complete	1	)	28+	epiphysis fully fused	F	length clavicle	length 138.22, circumference 4		shaft # with displacement and loss of length	displacement, so length cannot be used for sexing
clavicle	?	almost complete	1	)	28+	epiphysis fully fused	F	length clavicle	circumference. 2.9 m			
clavicle	R	sternal end	1	)	c.25	fused						
clavicle	R	almost complete	1	)	foetus/ neonate	length clavicle			length 47 (set), circumference 1.5			
clavicle	R	sternal end	1	) 39	very immature (?foetal)	size						
clavicle	R	fragments	30	)	various							min. no. based on matching ends & relative sizes

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
clavicle	L	fragments	28	)	various						thickening of bone with slight deviation, hole at site of break, possible pus sinus	
clavicle	L	almost complete	1	)	28+	epiphysis fully fused						
clavicle	L	complete	1	)	c.25	fused						
clavicle	?	fragments	52	)								side unclear
clavicle	?	fragments	2	)	children	size						
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?	length glenoid	36			sexually indeterminate
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?	length glenoid	36			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	F	length glenoid	30			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?	length glenoid	36			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	F	length glenoid	33			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	37			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?		not measurable			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?		not measurable			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	F	length glenoid	33			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	F	length glenoid	32			
scapula	R	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?		not measurable			
scapula	R	with glenoid cavity	1	)	immature	size			length glenoid 22.14			
scapula	R	with glenoid cavity	1	)	immature	size			length glenoid 10.6			
scapula	R	with glenoid cavity	1	)	immature	size			length glenoid 12.24			
scapula	R	with glenoid cavity	1	)	immature	size			length glenoid 18.21			
scapula	R	with glenoid cavity	4	)	15+	glenoid epiphysis fused			not measurable			
scapula	R	with glenoid cavity	4	)	?	?glenoid epiphysis fused						
scapula	R	with glenoid cavity	1	)	immature	size						
scapula	R	with glenoid cavity	1	)	?		?		not measurable			
scapula	R	with glenoid cavity	1	)	immature	length glenoid			23.86			
scapula	R	with glenoid cavity	1	)	immature	size			not measurable			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	37.41			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	37.38			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	36.77			
scapula	L	with glenoid cavity	1	) 34	15+	glenoid epiphysis fused	F	length glenoid	32.48			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?	length glenoid	36.28			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	F	length glenoid	30.64			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	F	length glenoid	32.56			
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?	length glenoid				
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	?	length glenoid				
scapula	L	with glenoid cavity	1	)	under 15	unfused			length glenoid 23.21			
scapula	L	with glenoid cavity	1	)	under 15	unfused			length glenoid 21.94			
scapula	L	with glenoid cavity	1	)	under 15	unfused			length glenoid 15.05			
scapula	L	with glenoid cavity	1	)	under 15	unfused			length glenoid 16.75			
scapula	L	with glenoid cavity	3	)	15+	glenoid epiphysis fused						
scapula	L	with glenoid cavity	4		?	?glenoid epiphysis fused	?					
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	M?	length glenoid	length glenoid 39.91		gross change in glenoid, large pits & additional growth	sex probably male but glenoid altered by pathology

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
scapula	L	with glenoid cavity	1	)	15+	glenoid epiphysis fused	M?	length glenoid	damaged, not measurable		glenoid cavity flattened & pitted, pathological change at attachment for triceps	sex probably male but glenoid altered by pathology
scapula	L	with glenoid cavity	2	)	15+	glenoid epiphysis fused	?	not measurable				
scapula	L	with glenoid cavity	1	)	under 15	unfused			mm			
scapula	L	with glenoid cavity	1	)	under 15	unfused			mm			
scapula	?	fragments	9	)								
scapula	?	with glenoid cavity	4	)	?		?	not measurable				
scapula	?	with glenoid cavity	1	)	immature	size						
scapula		fragments	31	)								
sternum		manubrium	1									
sternum		fragments body	4									one with 3 fused segments
sternum		fragments tip	2									both with fused segments
humerus	L	distal end	5	)	14+	distal epiphysis fused						
humerus	L	distal end	1	)	14+	distal epiphysis fused	?		55.49			
humerus	L	distal end	1	)	14+	distal epiphysis fused	F		50.36			
humerus	L	distal end	1	)	14+	distal epiphysis fused	?		55.01			
humerus	L	distal end	1	)	14+	distal epiphysis fused	M?		59.55			
humerus	L	distal end	1	)	14+	distal epiphysis fused	?		57.24			
humerus	L	distal end	1	)	14+	distal epiphysis fused	F		54.14			
humerus	L	distal 1/2	1	)	c. 1	estimated full length			length 100 (est.)			
humerus	L	distal 1/2	1	)	c. 6 months	estimated full length			length 80 (est.)			
humerus	L	distal 1/2	1	)	c. 1	estimated full length			length 90 (est.)			
humerus	L	distal 1/2	1	)	c. 6 months	estimated full length			length 80 (est.)			
humerus	L	proximal 1/2	1	)	c. 5	estimated full length			length 180 (est.)			
humerus	R	distal 1/2	1	)	c. 5	estimated full length			length 170 (est.)			
humerus	R	distal 2/3	1	) 16	c. 6 months	estimated full length			length 80 (est.)			
humerus	R	distal end	3	)	14+	distal epiphysis fused						
humerus	R	distal end	1	)	14+	distal epiphysis fused	M?		62.40			
humerus	R	head & part shaft	1	)	18+	head fused	F	diameter head	38.78			
humerus	R	head & part shaft	1	)	18+	head fused	F	diameter head	36.49			
humerus	?	detached head	1	)	18+	head fused	?	diameter head	45.84			

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Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
humerus	?	distal ends shaft	50	)	?	epiphysis not present						
humerus	?	detached heads	52	)								
humerus	?	distal ends & shaft	11	)	under 17	epiphysis unfused						various sizes & ages
humerus	?	proximal ends & shaft	12	)	under 20	epiphysis unfused						various sizes & ages
humerus	?	detached heads	13	)	under 20	epiphysis unfused						
humerus	?	shaft fragments	54	)								
humerus	?	distal ends	8	)	14+	epiphysis fused						
humerus	?	proximal end	1	)	c. 18-20	epiphysis fusing						
humerus	?	proximal end	1	)	18+	head fused						
humerus	?	unfused head	1	)	under 20	head unfused						
humerus	?	unfused capitulum	1	)	under 17							
humerus	?	fragments distal ends	8	)	14+	epiphysis fused						
radius	L	complete	1	)	14+	epiphysis fused	M?	length radius	length 252			
radius	L	complete	1	)	14+	epiphysis fused	F?	length radius	length 198			
radius	R	almost complete	1	)	14+	epiphysis fused	M?	length radius	length 250 (est.)			
radius	R	complete	1	)	c.5 years	epiphysis unfused			length 136			
radius	?	almost complete	1	)	foetus	epiphysis unfused/size			length 46 (est.)			
radius	?	proximal 1/2	1	)	foetus	estimated full length			length 40 (est.)			
radius		heads/tuberosities	58	) 29								
radius		fragments with distal ends	24	)	16+	epiphysis fused						
radius		fragments with distal ends	2	)	c.16	epiphysis recently fused						
radius		fragments with distal ends	1	)	under 16	epiphysis unfused						
radius		fragment	1	)	child	size						
radius		mid-shaft fragments	62	)							1 with long raised scar (30 x 5 mm) on distal side and very marked interosseous crest	
radius		unfused heads	2	)	under 17	epiphysis unfused			diameter heads 19: 13			
ulna	L	almost complete	1	)	9 month foetus	size			length 53 (est.)			
ulna	L	almost complete	1	)	9 month foetus	size			length 53 (est.)			
ulna	L	part only	1	)	foetus	size			not measurable			less than 53 mm
ulna	L	part only	1	)	foetus	size			not measurable			less than 53 mm
ulna	L	part only	1	)	8 month foetus	size			length 50 (est.)			
ulna	L	part only	1	)	foetus/ neonate	size			length 60 (est.)			full term foetus approx. 66 mm
ulna	L	part only	1	)	c 2 years	size			length 100 (est.)			
ulna	L	proximal ends & part shaft	6	)	child	size/unfused epiphysis			not measurable			
ulna	L	proximal ends & part shaft	21	) 45	19+	epiphysis fused					1 with fairly severe changes around whole of articulation, moderate lipping & pitting, reactive growth around olecranon & coronoid process	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
ulna	L	proximal ends & part shaft	8	)	?	proximal epiphysis damaged						
ulna	R	proximal ends & part shaft	26	)	19+	epiphysis fused					2 with pitting & slight lipping around whole articular area	
ulna	R	proximal ends & part shaft	6	)	under 19	epiphysis unfused			not measurable			based on size, 3 were c.12, 1 c.10, 1 c.2, 1 c. few months
ulna	R	proximal ends & part shaft	1	)	7-8 month foetus	size			length 45 (est.)			
ulna	R	proximal ends & part shaft	2	)	foetus (under 7 months)	size			not measurable			not measurable but smaller than above (45 mm)
ulna		shaft fragments	41	)								
ulna		shaft	1	)								area of gnawing at lower third - probably small mammal
ulna		fragments proximal end	4	)								
ulna		fragment distal end	1	)	15+	epiphysis fused						
ulna	R	fragment with radial notch	1	)								
ulna	L	fragment with radial notch	2	)								
scaphoid	not sided	complete or almost complete	30	)								
scaphoid		fragments	4	)								
hamate	not sided	complete or almost complete	32	)								
hamate		fragment	1	)	immature	size						
capitate	not sided	complete or almost complete	37	)								
capitate	not sided	fragments	2	)								
lunate	not sided	complete or almost complete	34	)								
pisiform	not sided	complete or almost complete	23	)								
triquetral	L	complete or almost complete	3	)								
carpals	not sided	complete, almost complete & fragments	63	)								
trapezoid	not sided	complete or almost complete	2	)	immature	size						
1st metacarpal	not sided	complete or almost complete	21	)	15+	epiphysis fused					1 with slight lipping around head; 1 with moderate lipping around head	
1st metacarpal	not sided	complete or almost complete	3	)	under 15	epiphysis unfused						
2nd metacarpal	R	fragment base	1	)								
2nd metacarpal	L	fragment base	1	)								
3rd metacarpal	?	complete	1	)	under 15	epiphysis unfused						
metacarpals	not sided	complete, almost complete & fragments	88	)	15+	epiphysis fused			46		1 with severe lipping around head and destruction of bone on articular surface	
metacarpals		complete	21	)	under 15	epiphysis unfused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
metacarpals		fragments	97	) 19							1 R proximal end 3rd metacarpal with moderate lipping on styloid process	
metacarpals		unfused heads	4	)	under 15	epiphysis unfused						
proximal phalanges	not sided	complete or almost complete	139	)	15+	epiphysis fused					1 with healed mid-shaft #, 1 with lipping proximal articulation	
proximal phalanges	not sided	complete or almost complete	30	)	under 15	epiphysis unfused						
proximal phalanges	not sided	complete or almost complete	4	)	under 15	epiphysis unfused						
middle phalanges	not sided	complete or almost complete	131	)	15+	epiphysis fused						
middle phalanx		epiphysis	1	)	under 15	epiphysis unfused						
1st distal phalanges	not sided	complete or almost complete	31	)	15+	epiphysis fused						
distal phalanges	not sided	complete or almost complete	51	)	15+	epiphysis fused					1 with lipping around proximal articulation	
distal phalanx	not sided	complete or almost complete	1	)	under 15	epiphysis unfused						
distal phalanx	not sided	complete or almost complete	2	)	under 15	epiphysis unfused						
phalanges		almost complete	2	)	foetal?	size, epiphysis unfused			lengths - 13 mm, 8 mm			
phalanges		fragments	17	)								
innominate		ischial tuberosity	42	)								
innominate		ischial tuberosity	2	)	20+	epiphysis fused						
innominate		acetabulum	75	)							3 with lipping around edge (1 moderate, 2 slight)	
innominate		sciatic notch	6	)			F	wide angle				
innominate		sciatic notch	6	)			male	narrow angle				
innominate		sciatic notch	3	)			?	unclear				
innominate		sciatic notch	2	)	very immature	size						
innominate		ilium	23	)	20+	iliac crest fused						
innominate		ilium	7	)	under 20	iliac crest unfused						
innominate		ilium	3	)	infant	size, not measurable						
innominate		pubic symphysis	2	)	35-44	Todd (phase VII-VIII)						matching pair
innominate		pubic symphysis	1	)	22-24	Todd (phase III)						
innominate		part ilium	1	)	under 15	primary element unfused						
innominate		iliac crest	3	)	under 20	iliac crest unfused						
innominate	L	ischium	2	)	under 15	primary element unfused						
innominate	L	ischium	1	) 13	c. 2 years	size			35.30			
innominate	L	ischium	1	)	c. 3 years	size			39.82			
innominate	R	ischium	4	)	under 15	primary element unfused						
innominate	R	ischium	1	)	c. 7 years	size			53.79			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
innominate	R	ischium	1	)	c. 5-6 years	size			47.06			
innominate		pubis	6	)	under 15	primary element unfused						
innominate		ilium	7	)	20+	iliac crest fused						
innominate		ilium	8	)	under 20	iliac crest unfused						
innominate		general fragments	8	)								
innominate		acetabulum	19	)								
innominate		sciatic notch	2	)			F	wide angle				
innominate		sciatic notch	1	)			M	narrow angle				
innominate		sciatic notch	1	)			?	unclear				
innominate		ilium with sciatic notch	2	)	under 13	primary elements unfused						fragments too incomplete to measure & assess age
innominate		acetabulum	13	)								
innominate		ilium with crest	14	)	20+	epiphysis fused						
innominate		ilium with crest	1	)	c.20	crest fusing						
innominate		ilium with crest	10	)	under 20	crest unfused						
innominate		general fragments	59	)								
femur	R	proximal 1/3	1	)	16+	head fused	M	diameter head	48.08			
femur	R	head & neck	1	)	16+	head fused	?	diameter head	44.88			
femur	R	head & neck	1	)	16+	head fused	F?	diameter head	42.31			
femur	R	head & neck	1	)	16+	head fused	F	diameter head	37.29		head not completely round, no neck margin on distal sides, head continues uninterrupted into neck	) possible pair
femur	L	head & neck	1	)	16+	head fused	F	diameter head	40.74		head not completely round, no neck margin on distal sides, head continues uninterrupted into neck	) possible pair
femur	R	proximal 2/3	1	)	c. 1	estimated full length			length 100 (est.)			
femur	L	head & neck + trochanters	1	)	16+	head fused	M	diameter head	46.77			
femur	L	head & neck + trochanters	1	)	16+	head fused	F	diameter head	38.79			
femur	L	head & neck	1	)	16+	head fused	M	diameter head	46.10			
femur	L	proximal 1/2	1	)	c. 1	estimated full length			full length 100 (est.)			
femur	?	head & neck	1	)	16+	head fused	M	diameter head	45.88			
femur	?	head & neck	1	)	16+	head fused	F	diameter head	41.28			
femur	?	head only	1	)	16+	head fused	F	diameter head	40.46			
femur	?	head only	1	)	16+	head fused	M?	diameter head	44.58			
femur	?	head only	1	)	16+	head fused	M	diameter head	50.34			
femur	?	head only	1	)	16+	head fused	F	diameter head	41.73			
femur	?	head only	1	)	16+	head fused	M	diameter head	47.78			
femur	?	head only	1	)	16+	head fused	F	diameter head	37.90			
femur	?	head only	1	)	16+	head fused	M	diameter head	46.22			
femur	?	head only	1	)	16+	head fused	M	diameter head	47.26			
femur	?	head only	1	)	16+	head fused	?	diameter head	44.34			
femur	?	head & neck	1	) 21	16+	head fused	F	diameter head	37.26			
femur	?	head only	1	)	16+	head fused	M?	diameter head	45.10			
femur	?	head & neck	1	)	16+	head fused	F	diameter head	40.58			
femur	?	head & neck	1	)	16+	head fused	F	diameter head	35.99			
femur	?	head only	1	)	16+	head fused	F	diameter head	39.45			
femur	?	part head & neck	1	)	16+	head fused	M?	diameter head	44.61			
femur	?	part head	1	)	16+	head fused	M	diameter head	49.44			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	part head & neck	1	)	16+	head fused	?	diameter head	44.37			
femur	?	part head	1	)	16+	head fused	?	diameter head	43.76			
femur	?	head only	1	)	16+	head fused	F	diameter head	36.40			
femur	?	head only	1	)	16+	head fused	F	diameter head	37.66			
femur	?	head only	1	)	16+	head fused	F	diameter head	40.04			
femur	?	head only	1	)	16+	head fused	F	diameter head	37.40			
femur	?	part head	1	)	16+	head fused	F	diameter head	39.40			
femur	?	part head	1	)	16+	head fused	?	diameter head	43.09			
femur	?	head only	1	)	16+	head fused	F	diameter head	39.82			
femur	?	head only	1	)	16+	head fused	F	diameter head	36.84			
femur	?	head only	1	)	under 18	head unfused			38.04			
femur	?	head only	1	)	under 18	head unfused			30.45			
femur	?	head only	1	)	under 18	head unfused			29.26			
femur	?	head only	1	)	under 18	head unfused			32.49			
femur	?	head only	1	)	under 18	head unfused			30.44			
femur	?	head only	1	)	under 18	head unfused			not measurable			
femur	?	distal end	1	)	17+	distal epiphysis fused	F?	bicondylar width	72.88			
femur	?	distal end	1	)	17+	distal epiphysis fused	M?	bicondylar width	77.27			
femur	?	fragments distal end	113	)	17+	distal epiphysis fused			not measurable			
femur	?	fragments distal end	16	)	under 19	distal epiphysis unfused			not measurable			
femur	?	fragments trochanter	15	)								
femur	?	proximal ends	22	)	under 18	head & trochanters unfused						
femur		shaft fragments	108	)								
femur		fragment with head unfused	1	)	under 18	head unfused						
femur		fragment condyles	1	)	17+	distal epiphysis fused						
femur		greater trochanter	3	)	under 18	epiphysis unfused						
femur		fragment neck & head	1	)	16+	head fused			not measurable			
femur		fragment proximal end	1	)	under 18	head unfused						
femur		fragments distal end	35	)	17+	epiphysis fused						
patella	L	complete	27	)							3 with pitting on facets, 1 with lipping around facets, 1 with large pits on anterior surface	1 with vastus notch, see notes for measurements
patella	R	complete	29	) 29							5 with pitting and/or lipping	see notes for measurements
patella	?	fragments	8	)								
patella		fragments	2	)								
tibia		distal ends	30		16+	distal epiphysis fused					2 with pitting on talar articular surface & one of these with lipping around edge of articulation	
tibia		fragment distal end	4									
tibia		fragment distal epiphysis	2		under 18	epiphysis unfused						
tibia		proximal ends	15		16+	epiphysis fused						
tibia		fragments proximal ends	33		16+	epiphysis fused						
tibia		fragments proximal epiphyses	6		under 20	epiphyses unfused						
tibia		shaft fragments	5		under 20	epiphysis unfused			not measurable			
tibia		shaft fragments	46									
tibia		tibial plateau	6		16+	epiphysis fused						
tibia		proximal ends	2		under 20	epiphysis unfused						
tibia		fragments tibial plateau	12		16+	epiphysis fused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
tibia		fragments tibial plateau	4		under 20	epiphysis unfused						
tibia		fragments distal ends	8		16+	distal epiphysis fused						
tibia		fragments distal epiphysis	2		under 16	epiphysis unfused						
fibula		proximal ends	2	)	16+	epiphysis fused						
fibula		distal ends	22	)	16+	epiphysis fused						
fibula		shaft fragment	1	)							shaft fracture, callus formation	
fibula		almost complete	1	)	c.5	length			185			Saunders et al, 1993
fibula		almost complete	1	)	9 months	length			90 (est.)			Saunders et al, 1993
fibula		almost complete	1	)	9 month foetus	length			50			
fibula		part diaphysis	1	)	neonate?	length			not measurable			larger than 50 mm
fibula		part diaphysis	1	) 19	neonate?	length			not measurable			larger than 50 mm
fibula		part diaphysis	1	)	neonate?	length			not measurable			larger than 50 mm
fibula		shaft fragments	83	)							3 with periosteal reaction on shaft	
fibula		shaft fragments	2	)	foetal?	size						
fibula		distal ends	2	)	16+	epiphysis fused						
fibula	L	distal ends	2	)	16+	epiphysis fused						
fibula	R	distal ends	2	)	16+	epiphysis fused						
fibula	R	distal end	1	)	under 18	epiphysis unfused						
talus	L	complete or almost complete	24	)								
talus	L	complete	1	)							slight lipping on posterior side head	
talus	L	complete	1	)							slight lipping on posterior side head & around posterior calcaneal articular surface	
talus	L	complete	1	)							extensive lipping on lower edge posterior calcaneal surface	
talus	L	complete	1	)							extensive lipping on lower edge posterior calcaneal surface	
talus	R	complete or almost complete	25	)								
talus	R	complete	1	)							extensive lipping on lower edge posterior calcaneal surface	
talus	R	complete	1	) 29							extensive lipping on lower edge posterior calcaneal surface & moderate lipping posterior edge of head	
talus	R	complete	1	)							extensive lipping on lower edge posterior calcaneal surface	
talus	R	almost complete	1	)							extensive lipping posterior calcaneal surface	
talus		fragments	19	)								
talus		fragments	8	)								
talus		fragments	6	)								
calcaneus	L	complete or almost complete	17	)								
calcaneus	L	complete	1	)							double facets for middle & anterior talal surface, pitting in centre middle arcticulation, lipping medial process on posterior surface	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
calcaneus	L	complete	1	)							moderate lipping posterior & middle talal surfaces	
calcaneus	R	complete or almost complete	11	)								
calcaneus	R	almost complete	1	)							large area bony growth (18x18x6) on medial process posterior surface - worn flat with pitting	
calcaneus	R	complete	1	)							spurs bony growth posterior surface	
calcaneus	R	complete	1	)							spurs bony growth posterior surface	
calcaneus	R	complete	1	)							spurs bony growth posterior surface	
calcaneus	?	fragments	2	)								
calcaneus		fragments	12	)								
navicular		complete or almost complete	41	)								
navicular		fragments	3	)								
cuboid		complete or almost complete	37	)								
1st cuneiform		complete or almost complete	23	)								
1st cuneiform	R	complete	1	)								
1st cuneiform	L	almost complete	1	)								
1st cuneiform		fragments	2	)								
2nd & 3rd cuneiforms		complete or almost complete	67	)								
2nd & 3rd cuneiforms		fragments	10	)								
tarsals		fragments	10	)								
1st metatarsal		complete or almost complete	27	)	15+	epiphysis fused					4 with pathological change to the head, 1 slight lipping, 1 moderate, 1 with destruction & 1 with eburnation	
1st metatarsal	R	complete	1	)	15+	epiphysis fused			58.51	161.70		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			51.24	149.48		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			56.68	158.62		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			57.15	159.41		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			56.66	158.59		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			55.30	156.30		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			65.69	173.76		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			51.24	149.48		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			65.49	173.42		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			58.71	162.03		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			68.80	178.98		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			57.72	160.37		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			68.47	178.43		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			65.06	172.70		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			63.25	169.66		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			58.14	161.08		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			62.14	167.80		
1st metatarsal		fragment	1	)	under 15	epiphysis unfused						
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			71.85	169.72		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			61.15	155.16		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			65.91	161.64		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			60.86	154.77		

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			63.57	158.46		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			65.09	160.52		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			64.04	159.09		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			63.95	161.03		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			78.21	180.99		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			71.41	171.47		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			66.72	164.91		
4th metatarsal	L	complete	1	)	under 15	epiphysis unfused						
5th metatarsal	L	fragment	1	)								
5th metatarsal	L	complete	1	)	15+	epiphysis fused			52.88	155.93		functional length taken
5th metatarsal	L	complete	1	)	15+	epiphysis fused			58.77	164.59		functional length taken
5th metatarsal	L	complete	1	)	15+	epiphysis fused			52.68	155.64		functional length taken
5th metatarsal	L	complete	1	)	15+	epiphysis fused			56.37	161.06		functional length taken
5th metatarsal	L	fragment proximal end	1	)								
5th metatarsal	L	complete or almost complete	2	)	under 15	epiphysis unfused			40.12			
metatarsals		almost complete	87	)	15+	epiphysis fused						
metatarsals		fragments	16	)								
metatarsals		fragments	32	)								heads and shafts
metatarsals		complete or almost complete	5	)	under 15	epiphysis unfused						
metatarsals		unfused head	1	)	under 15	epiphysis unfused						
metatarsals		fragments	130	)								
1st proximal phalanges		complete or almost complete	48	)	15+	epiphysis fused					3 with slight or moderate lipping around base, 1 with lipping around base & head	
1st proximal phalanx		complete	1	)	under 15	epiphysis unfused						
1st proximal phalanges		fragments head	4	)								
1st proximal phalanges		fragment head	1	)								
proximal phalanges		complete or almost complete	95	)	15+	epiphysis fused					1 with gross distortion of head	
proximal phalanges		complete or almost complete	5	)	under 15	epiphysis unfused						
proximal phalanges		complete	1	)	15+	epiphysis fused						
proximal phalanges		fragment	1	)	15+	epiphysis fused						
proximal phalanges		complete	2	)	15+	epiphysis fused						
middle phalanges		complete or almost complete	33	)	15+	epiphysis fused					2 with lipping around base	
middle phalanges		complete or almost complete	2	)	15+	epiphysis fused						
middle phalanges		complete	2	)	15+	epiphysis fused						
1st distal phalanges		complete or almost complete	17	)	15+	epiphysis fused					1 with lipping around base	
1st distal phalanges		almost complete	2	)	15+	epiphysis fused						
distal phalanges		complete or almost complete	9	)	15+	epiphysis fused						
distal phalanges		almost complete	1	)	15+	epiphysis fused						
middle & distal phalanges		complete	2	)	15+	epiphysis fused					both bones ankylosed	
general long bone		fragments	3003									
			12469									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal		fragments with frontal crest	5	)								
frontal	L	fragments with orbit	4	)								
frontal	L	fragment with orbit	1	)							area of thickened reactive growth in orbit, orbit edge sharp bone fine - probably immature	
frontal	?	fragment of orbit	1	) 5							raised area of reactive growth, small fragment side unclear, appears immature	
frontal	?	fragments of orbit	4	)								
				)								
temporal	R	petrous part	12	)								
temporal	L	petrous part	8	) 12							1 with large smooth hole (8 x 6 mm) on medial side on external auditory meatus, destroying the medial edge of the meatus - sinus? Internal auditory meatus is much smaller than normal - evidence of deafness?	
temporal	?	fragments petrous part	8	)								
temporal	?	fragments mastoid area	26									
temporal	?	fragments with temporomandibular joint/ zygomatic process	19									
temporal	?	fragments zygomatic process	19									
parietal	?	fragments	65									
malar	R	fragments	12	)								
malar	L	fragments	11	) 12								
sphenoid		fragments	26									
occipital		general fragments	18	)								
occipital		basilar part	4	)	17+	basilar part fused to sphenoid						
occipital		basilar part	1	)	under 25	basilar part unfused to sphenoid						
occipital		basilar part	1	)	under 6	basilar part unfused to lateralis						
occipital		basilar part	1	) 11	under 25?	epiphysis for condyle unfused						
occipital	R	pars lateralis	4	)	under 6	basilar part unfused to lateralis						
occipital	R	pars lateralis	1	)	under 3	unfused to squamous part						
occipital	L	pars lateralis	2	)	under 6	basilar part unfused to lateralis						
occipital	L	pars lateralis	1	)	under 3	unfused to squamous part						
occipital	?	small fragments lateral part	14	)	?							
cranium		general cranial fragments	927									
mandibles	R	fragments	5	)								see separate spreadsheet
mandibles	L	fragments	6	)								see separate spreadsheet
mandibles	?	fragments	2	)								sockets but unclear which
mandibles	R/L	fragment chin area, inferior part	1	) 12								
mandibles	?	undiagnostic fragments	20	)								
mandibles	R	fragments with heads	6	)								some very immature
mandibles	L	fragments with heads	12	)								some very immature
maxilla	R	fragments	6	)								see separate spreadsheet
maxilla	L	fragments	8	)								see separate spreadsheet
maxilla	?	fragments with sockets	11	) 10								sockets but unclear which
maxilla	?	undiagnostic fragments	32	)								
loose teeth		complete or alcp	9									see separate spreadsheet
loose teeth	?	tooth germs, either 2nd or 3rd lower molars	3		?							not entered on loose teeth sheet

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
loose teeth		undiagnostic fragments	82									
atlas	R	fragments with R facets	8	)								
atlas	R	fragments with R facets	3	)	under 4	arch unfused at posterior part						
atlas	L	fragments with L facets	6	)							1 with pitting superior facet	
atlas	L	fragments with L facets	1	)	under 4	arch unfused at posterior part						
atlas	?	fragments with 1 superior & 1 inferior facet	7	)								
atlas		fragments posterior arch	4	)								
atlas		fragment with facet for dens	3	)							I with slight lipping around facet for dens	
axis		alcp	1	)								
axis		fragments with body and dens	2	)								
axis		fragments with body and dens	1	)	child	epiphysis for dens fusing						
axis		fragment dens only	1	)								
axis		fragments with superior facets	3	)								
axis		fragment with superior facet & neural arch	1	)	child	body & posterior arch unfused						
axis		body only	1	)	child	dens and body unfused			14 x 11			
axis		body only	1	)	foetal?	dens and body unfused/size			8 x 5			
CV		fragments with bodies	25	)	25+	epiphyseal ring fused					1 with moderate lipping around inferior edge body (superior edge damaged)	
CV		fragment with bodies	1	)	c.25	epiphyseal ring fusing						
CV		fragments with bodies	1	)	under 25	epiphyseal ring unfused						
TV		fragments with bodies	23	)	25+	epiphyseal ring fused						
TV		fragments with bodies	2	) 11	c. 7	body fusing to arch						
TV		fragments with bodies	4	)	under 25	epiphyseal ring unfused						all appear similar size - at least 3 articulate
LV		fragments with bodies	16	)	25+	epiphyseal ring fused						
LV		fragments with bodies	6	)	under 25	epiphyseal ring unfused						
LV		fragments with bodies	2	)	c. 7	body fusing to arch						
LV		unfused body	1	)	under 8	body unfused to arch						
VT		fragments of body	65	)	25+	epiphyseal ring fused					4 with moderate lipping	
VT		fragments of body	16	)	under 25	epiphyseal ring unfused						
VT		unfused body	3	)	under 8	body unfused to arch						
sacrum		1st body	6	)	under 6	unfused bodies						
sacrum		1st body	1	)	25+	epiphyseal ring fused						
sacrum		fragment 1st body	1	)								
sacrum		fragment middle bodies	3	)								
sacrum		5th bodies	2	)								
sacrum		sacral crest	2	)								
coccyx		4 fused bodies	1	)								
coccyx		bodies	5	)								
VT		miscellaneous VT fragments	486	)								
ribs	?	fragments shafts	473								1 with healed # with slight displacement (appears adult), 2 fragments from same child with callus formation - 2 ribs ~#?	
ribs	?	fragments with sternal end	17									
ribs	?	fragments with heads/tubercles	21		under 20	epiphyses unfused						
ribs	?	fragments with heads/tubercles	1		c. 20	epiphysis for head fusing						
ribs	?	fragments with heads/tubercles	71		20+	epiphyses fused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
clavicle	R	fragment with conoid tubercle	5	)	?							
clavicle	L	fragment with conoid tubercle	2	)	+19	acromial epiphysis fused						
clavicle	L	fragment with conoid tubercle	1	)	under 20	acromial epiphysis unfused						
clavicle	L	fragment with conoid tubercle	3	)	?							
clavicle	R	fragment with sternal end	1	) 6	25+	sternal epiphysis fully fused						
clavicle	R	fragment with sternal end	1	)	?							
clavicle	L	fragment with sternal end	1	)	25+	sternal epiphysis fully fused						
clavicle	L	fragments with sternal end	2	)	under 25	sternal epiphysis fully unfused						
clavicle	?	fragments shafts	5	)								
scapula	?	fragments of acromion	4	)	16+	epiphysis fused						
scapula	?	fragments of acromion	8	)	?							
scapula	?	coracoid process	2	)	15+	coracoid fused						
scapula	?	coracoid process	1	)	under 18	unfused coracoid						
scapula	?	coracoid process	5	)	?							
scapula	R	fragment with glenoid cavity	1	) 6	under 18	glenoid epiphysis unfused						
scapula	L	fragment with glenoid cavity	1	)	?							
scapula	R)	fragment with glenoid cavity	) 1	)	child c.5?	glenoid epiphysis unfused; size			length glenoid 18 mm			) matching pair
scapula	L)	fragment with glenoid cavity	) 1	)	child c.5?	glenoid epiphysis unfused; size			length glenoid 18 mm			) matching pair
scapula	?	fragments glenoid cavity	7	)	?							
scapula	?	undiagnostic fragments	29	)								
sternum		fragment body with costal notch	1	)								
humerus	R	unfused head	1	)	under 20	head unfused						) matching pair
humerus	L	unfused head	1	)	under 20	head unfused						) matching pair
humerus	?	unfused head	4	)	under 20	head unfused						
humerus	R	proximal ends	2	)	under 20	head unfused						
humerus	R	distal end	1	) 10	14+	distal epiphyses fused	F	epicondylar width	epicondylar width 48.46			
humerus	L	distal 2/3	1	)	neonate	estimated full length			est. full length 72			
humerus	R	distal 1/3	1	)	neonate	similar dimensions to above						
humerus	?	small fragments distal end	10	)	14+	distal epiphyses fused						
humerus	?	small fragments distal end	3	)	?							
radius	?	fragments with radial notch	4	)	under 17	epiphysis unfused						
radius	?	fragments with radial notch	1	)	14+	epiphysis fused						
radius	?	fragment head	1	) 6	14+	epiphysis fused						
radius	?	fragments with distal end	3	)	16+	epiphysis fused						
radius	R	fragments unfused distal epiphysis	2	)	under 18	epiphysis unfused						
ulna	R	proximal end	1	)	under 17	epiphysis unfused						
ulna	R	proximal end	2	)	?							
ulna	L	proximal end	3	)	under 17	epiphysis unfused						
ulna	L	proximal end	3	)	?							
ulna	?	small fragments olecranon	4	) 9	14+	epiphysis fused						
ulna	?	small fragments olecranon	2	)	under 17	epiphysis unfused						
ulna	?	fragments distal end	5	)	15+	epiphysis fused						
ulna	?	fragments distal end	2	)	under 18	epiphysis unfused						
ulna	?	unfused distal epiphysis	1	)	under 18	epiphysis unfused						
scaphoid	R	complete	2	)								
scaphoid	L	complete	1	)								
lunate	R	complete	3	)								
lunate	L	complete	2	)								
triquetral	L	complete	1	)								
triquetral	?	fragments	4	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
pisiform	?	complete	4	)								
trapezium	R	complete	2	)								
trapezium	L	complete	4	)								
trapezoid	R	complete	1	)								
trapezoid	L	complete	4	)								
capitate	R	complete	3	)								
capitate	L	complete	5	)								
hamate	R	complete or alcp	5	)								
hamate	L	complete or alcp	3	)								
1st metacarpal	R	distal 1/2	1	)								
1st metacarpal	L	complete or alcp	2	)	15+	epiphysis fused			39.23			
1st metacarpal	?	distal 1/2	1		child	size						
2nd metacarpal	R	proximal 1/2	4	)								
2nd metacarpal	L	proximal 1/2	3	)								
3rd metacarpal	R	head missing	2									
3rd metacarpal	R	complete	1	)	under 15	epiphysis unfused						
3rd metacarpal	L	heads missing	4	) 5								
4th metacarpal	R	alcp	1	)	15+	epiphysis fused						
4th metacarpal	L	complete or alcp	2	)	15+	epiphysis fused			54.91			
5th metacarpal	R	alcp	2	)	15+	epiphysis fused						
5th metacarpal	L	complete or alcp	3	)	15+	epiphysis fused			46.53, 47.80			
5th metacarpal	L	complete	1	)	under 15	epiphysis unfused						
5th metacarpal	?	proximal 1/2	1		child	size						
metacarpals		fragments	40	)								
metacarpals		alcp	2	)	under 15	epiphysis unfused						
metacarpals		unfused heads	2	)	under 15	epiphysis unfused						
proximal phalanges		complete or with bases	27	)	15+	epiphysis fused						
proximal phalanges		complete	3	)	under 15	epiphysis unfused						
proximal phalanges		unfused epiphyses	3	)	under 15	epiphysis unfused						
middle phalanges		complete or alcp	31	)	15+	epiphysis fused						
middle phalanges		complete or alcp	10	)	under 15	epiphysis unfused						
distal phalanges		complete or alcp	16	)	15+	epiphysis fused						
distal phalanges		complete or alcp	2	)	under 15	epiphysis unfused						
phalanges		fragments	26	)								
innominate	L	complete unfused ischium	1		foetus/ neonate	length ischium			length 18, width 12			) probable match
innominate	L	alcp unfused pubis	1		foetus/ neonate?	match for above			length 22 (est.)			) probable match
	L	alcp unfused pubis	1		foetus/ neonate?	same size as pubis above						
	R	fragment unfused pubis	1		foetus/ neonate?	size						
innominate	R	fragments with ischial tuberosity	1	)	20+	ischial epiphysis fused						
innominate	L	fragments with ischial tuberosity	1	)	20+	ischial epiphysis fused						
innominate	L	fragments with ischial tuberosity	1	)	under 20	ischial epiphysis unfused						
innominate	?	fragments with part acetabulum	17	) 6								
innominate	?	fragments with greater sciatic notch	2	)			2 M?	very narrow greater sciatic notch				
innominate	?	fragments with greater sciatic notch	3	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
innominate	?	fragments ilium with sacral crest	13	)	20+	crest fused						
innominate	?	fragments ilium with sacral crest	10	)	under 20	crest unfused						
innominate	?	fragment unfused sacral crest	1	)	under 20	crest unfused						
innominate	?	small fragments pubic symphysis	4	)								
innominate	?	undiagnostic fragments	71	)								
femur	L	proximal end	1	)	under 18	proximal epiphysis unfused						
femur	R	proximal end	1	)	under 18	proximal epiphysis unfused						
femur	?	fragments proximal end	4	)	under 18	proximal epiphysis unfused						
femur	?	unfused heads	4	)	under 18	proximal epiphysis unfused			diameters: 19, 16, 23, 21			
femur	?	fragments unfused condyles	7	) 6	under 18	condyles unfused						at least 5 individuals
femur	?	fragment condyle	1	)	16+	distal epiphysis fused						many fragments of condyles among general long bone, but in none was there clear evidence that they had fused
femur	L	fragment distal end	2	)	under 18	distal epiphysis unfused						
femur	R	fragment distal end	1	)	under 18	distal epiphysis unfused						
femur	?	unfused epiphysis greater trochanter	1	)	under 18	epiphysis greater trochanter unfused						
patella	R	complete	1	)	child	size			26 x 27			) matching pair
patella	L	complete	1	)	child	size			26 x 27			) matching pair
patella	R	complete	1	) 5	child	size			27 x 27			
patella	L	fragment	3	)								
tibia	?	fragments proximal end	7		16+	epiphysis fused						
tibia	?	fragments proximal end	3		under 20	epiphysis unfused						
tibia	?	fragments unfused proximal epiphyses	11		under 20	epiphysis unfused						
tibia	?	fragment distal end tibia	2		16+	epiphysis fused						
tibia	?	fragment unfused distal epiphysis	2		under 18	distal epiphysis unfused						
tibia	?	distal 1/2 tibia	1		few months	estimated full length			estimated full length 80			
tibia	?	distal 1/3 tibia	1		c. 6 months	estimated full length			est. full length 90			
fibula	?	distal 1/2	1	)	foetus/ neonate	estimated full length			est. full length 53			
fibula	R	distal end	1	)	16+	epiphysis fused						
fibula	R	distal end	3	) 5	?							
fibula	L	distal end	2	)	16+	epiphysis fused						
fibula	L	distal end	2	)	?							
1st cuneiform	L	complete or alcp	4	)								
2nd cuneiform	R	complete or alcp	3	)								
2nd cuneiform	L	complete or alcp	2	)								
3rd cuneiform	R	complete or alcp	5	)								
3rd cuneiform	L	complete or alcp	2	)								
cuneiform		fragments	4	)								
cuboid	R	alcp	1	)								
navicular	R	complete	1	)								
navicular	L	complete or alcp	5	)								
navicular		fragments	4	)								
talus		fragments	10	)								
calcaneus		fragments	5	)								
1st metatarsal	R	complete	1	)	under 15	epiphysis unfused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st metatarsal	R	bases only	2	)	15+	epiphysis fused						
1st metatarsal	L	bases only	2	)	15+	epiphysis fused						
1st metatarsal		fragments	5	)								
2nd metatarsal	R	bases only	2	)								
2nd metatarsal	L	bases only	3	) 8								
3rd metatarsal	R	base only	1	)								
3rd metatarsal	L	bases only	2	)								
4th metatarsal	R	bases only	2	)								
4th metatarsal	L	base only	1	)								
4th metatarsal	L	complete	1	)	under 15	epiphysis unfused						
5th metatarsal	R	bases only	2	)								
5th metatarsal	L	heads missing	2	)								
5th metatarsal	L	complete	1	)	under 15	epiphysis unfused						
metatarsals		fragments	59	)								
metatarsals		unfused head	1	)	under 15	head unfused						
1st proximal phalanx		complete or alcp	8	)	15+	epiphysis fused						
1st proximal phalanx		complete	2	)	under 15	epiphyses unfused						
1st proximal phalanx		base only	1	)	15+	epiphysis fused						
proximal phalanx		complete or alcp	10	)	15+	epiphysis fused						
proximal phalanx		complete	2	)	under 15	epiphyses unfused						
middle phalanx		complete	3	)	15+	epiphysis fused						
1st distal phalanx		complete or alcp	11	)	15+	epiphysis fused						
distal phalanges		complete or alcp	6	)	15+	epiphysis fused						
general long bone		fragments	442									
Total identified fragments			3878									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal	R	with right orbit	16	)	?		?				3 with pitting in orbit	some may be immature
frontal	central	with brow ridge	6	)	?		?					
frontal	L	with left orbit	16	)	?		?				1 with pitting on orbital surface	some may be immature
frontal	L	with left orbit	1	) 17	child	size					very marked pitting in orbit	side difficult to assess
frontal	?	with orbit edge	5	)	child	size					1 with pitting on orbital surface	side difficult to assess
frontal	?	with orbit edge	15	)	?							
temporal	R	petrous part	53	)	?		?					
temporal	L	petrous part	48	) 53	?		?					
temporal	?	fragments petrous part	15	)	?							
temporal	L	mastoid process	6	)			M?	size				
temporal	L	mastoid process	8	)			F?	size				
temporal	L	mastoid process	4	)			?					
temporal	L	mastoid process	1	)	child	size						
temporal	R	mastoid process	7	)			M?	size			1 fragment with pitting and abnormal growth all around surface of external auditory meatus	
temporal	R	mastoid process	7	) 26			F?	size				
temporal	R	mastoid process	2	)			?					
temporal	R	mastoid process	1	)	child	size						
temporal	?	mastoid process	4	)			M?	size				
temporal	?	mastoid process	2	)			F?	size				
temporal	?	mastoid process	8	)			?					
temporal	?	with mandibular fossa	1		?		?				moderate pitting on fossa surface	
occipital	-	basilar part	1	)	under 25	line of fusion across condyles still billowed, basilar surface billowed						
occipital	R	pars lateralis	1	)	under 6	pars lateralis unfused						different size to below
occipital	L	pars lateralis	1	) 4	under 6	pars lateralis unfused						different size to above
occipital	L	pars lateralis	1	)	under 6	pars lateralis unfused						different size to above
occipital	-	fragment condyle	1								condyle flattened and worn, very slight lipping around edge	
occipital	-	fragment condyle	1								slight pitting on surface very slight lipping around edge	
malar	?	fragments	15									3 with crease on inferior surface at suture; 1 with open suture on interior surface
hyoid	-	body	10									
hyoid	-	fragments greater horn	4									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
cranium		fragments	3261								11.07, 11.12, 10.91, 10.15, 10.94, 11.49 - malaria?; 2 fragments had red-brown staining on cerebral surface - spots 3-7 mm some bone destruction within spots - unclear whether this is pre or post mortem; 3 fragments with depressions and pitting on cerebral surface, 1 also has pitting on external surface; 1 fragment with very small cyst on external surface	
mandible	R	fragments	40	)								see separate spreadsheet
mandible	L	fragments	33	) 33								see separate spreadsheet
mandible	R/L	fragments	8	)								see separate spreadsheet
mandible	?	small fragments	11									fragments w. sockets, too small to identify which teeth
mandible	R	heads	12									at least 2 from very immature individuals
mandible	R	head	1								slight pitting on articular surface	
mandible	R	head	1								flattening, pitting & bone destruction on articular surface	
mandible	R	head	1								marked flattening, destruction & pitting on articular surface	
mandible	R	head	1								articular area has severe destruction, marked wear, depressed oval area w. pitting	
mandible	R	head	1								flattening of articular surface, slight pitting, + destruction on distal side	
mandible	R	head	1								deformed head w. slight bifurcation on medial side, small foramen within bifurcation	
mandible	L	head	16									6 from very young individuals
mandible	L	head	1								deep depressed area of bone destruction w. pitting inside, slight lipping at anterior and distal edges	
mandible	L	head	1								head almost totally destroyed w. pitting all over & lipping around, particularly round anterior edge	
mandible	L	head	1								oval area of destruction w. pitting in centre, slight pitting on anterior edge	
mandible	L	head	1								articular area flattened & slightly pitted	
mandible	L	head	1								head worn flat on anterior side, slight flattening on superior posterior area w. some sporadic destruction	
mandible	L	head	1								depressed, pitted area posterior surface of articulation, also post mortem damage	
maxilla	R/L	fragment	1	)								see separate spreadsheet
maxilla	R	fragments	9	) 12								see separate spreadsheet
maxilla	L	fragments	12	)								see separate spreadsheet
maxilla	?	small fragments	4	)							two have abscess chambers in one socket	fragments w. sockets too small to identify which teeth
maxilla	?	small fragments	4	)								fragments without sockets

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
atlas	-	fragments with facet for dens of axis	24	)							4 have lipping around rim of facet, 1 moderate, 3 slight	
atlas	L	fragments with superior & inferior facets	6	)							3 with pitting/lipping both facets	
atlas	R	fragments with superior & inferior facets	9	) 27							1 with moderate pitting and lipping of both facets	
atlas	?	fragments with superior & inferior facets	15	)							1 with moderate lipping around superior facet	
atlas	L	fragments with superior & inferior facets	3	)	under 7	arch unfused						
atlas	R	fragments with superior & inferior facets	1	)	under 7	arch unfused						
atlas	R	fragments with superior & inferior facets	1	)	c. 7	posterior arch unfused, anterior arch fusing						
axis	-	fragments with dens	23								8 fragments with lipping around dens	
CV	-	bodies	111		25+	epiphyseal rings fused					21 fragments with lipping/pitting on bodies	
CV	-	bodies	8		under 25	epiphyseal rings unfused						
TV	-	bodies	5		child over 7	lines of fusion to body still visible, epiphyseal ring unfused					3 bodies with marked distortion to right with flattening of body (same individual); 1 with flattening anterior body & slight skewing to right - may be same individual	
TV	-	bodies	10		under 25	epiphyseal rings unfused						
TV	-	bodies	17		c. 25	epiphyseal rings fusing						
TV	-	bodies	70		25+	epiphyseal rings fused					11 bodies with slight lipping, 4 with Schmorl's nodes, 1 with gross irregular growth and pitting of inferior surface, 2 with osteophytic formation on underside lamina, 1 with pitting lipping & gross destruction of inferior facets	
LV	-	bodies	12	6	under 25	epiphyseal rings unfused						
LV	-	bodies	4		c. 25	epiphyseal rings fusing						
LV	-	bodies	12		25+	epiphyseal rings fused					1 with Schmorl's nodes & pitting & irregular growth on inferior surface, 4 with pitting & irregular growth on body surfaces, 2 with slight lipping around body edges, 1 with severe lipping on superior edge body & slight lipping on inferior edge	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
VT	-	fragments body	27		under 25	epiphyseal rings unfused						
VT	-	fragments body	14		c. 25	epiphyseal rings fusing						
VT	-	fragments body	244		25+	epiphyseal rings fused					15 fragments with slight lipping around edges, 10 fragments with moderate lipping around edges, 3 fragments with severe lipping around body edges, 6 fragments with pitting & irregular growth on body surfaces	
VT	-	miscellaneous vertebral fragments	53								7 with osteophytes on underside lamina, 4 with osteophytes underside lamina & pitting & lipping of facets, 42 with lipping and pitting of articular facets	
VT	-	miscellaneous vertebral fragments	1739									
VT	-	bodies	14		under 7	bodies unfused to arches						
VT	-	bodies	7		c. 7	bodies fusing to arches						
VT	-	arches	23		3-7	arches fused bodies unfused						
VT	-	arches	22		under 3	halves of arches unfused						some tiny - foetal or neonate
sacrum	-	fragments 1st body	15		25+	epiphyseal rings fused					1 with slight lipping around body edge	
sacrum	-	fragments 1st body	6		under 25	epiphyseal rings unfused						
sacrum	-	fragments 1st body	2		?							
sacrum	-	fragments bodies	19								1 with sacral hiatus	
coccyx	-	1st body	9									
ribs		fragments with tubercle	262								19 fragments with pathology - see notes for details	
ribs		fragments body	1208									
sternum		fragment manubrium	1									
sternum		fragments body	1									unfused
clavicle	L	fragments with conoid tubercle	27	)								
clavicle	L	fragment with conoid tubercle	1	)	c. 7-8				estimated full length 85 mm			
clavicle	L	fragment with conoid tubercle & acromial end	1	)	20+	epiphysis fully fused					3 pits and slight deviation acromial 1/3 = #; pitting and slight lipping around acromial articulation (sternal end missing)	
clavicle	L	fragment with sternal end	1	)	c. 25-28	epiphysis 2/3 fused						
clavicle	L	fragment with sternal end	1	)	25+	epiphysis fully fused					large lesion 9x5x4 mm at site for costoclavicular ligament, surface of bone fully destroyed - torn ligament?	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
clavicle	L	fragment with sternal end	3	)	25+	epiphysis fully fused						
clavicle	L	fragment with sternal end	1	)	c.7-8				estimated full length 90 mm			
clavicle	L	fragment with sternal end	1	)	c. 2-3				estimated full length 60 mm			
clavicle	R	fragments with conoid tubercle	37	) 38								
clavicle	R	fragment with conoid tubercle	1	)	c. 4				estimated full length 70 mm			
clavicle	R	sternal 1/3	1	)	?	?					articular surface irregular but appears unfused, area of porosis on superior side just medial to sternal articulation, slight flattening when viewed anterior/posteriorly, slight deviation from superior view = #/dislocation?	
clavicle	R	fragment with sternal end	1	)	25+	epiphysis fully fused					slight pitting on articulation	
clavicle	R	fragment with sternal end	1	)	c. 25	epiphysis 1/3 fused						
clavicle	R	fragment with sternal end	1	)	c. 25-28	epiphysis 2/3 fused						
clavicle	R	fragment with sternal end	1	)	?						gross hollowed destruction of articulation, part of surface still billowed so epiphysis possibly unfused	
clavicle	R	fragment with sternal end	1	)	c.10				estimated full length 95			
clavicle	R	fragment with sternal end	1	)	c.10				estimated full length 100			
clavicle	?	mid-shaft fragments	53	)								
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M	length glenoid	39.82		slight lipping around edge of glenoid	
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	F	length glenoid	31.29			
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	F	length glenoid	30.45			supra scapular foramen present
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	?	length glenoid	36.13			
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M	length glenoid	39.18		oval depression in centre of glenoid - 7x5 mm deep, centre of depression pitted, margin of depression slightly raised, pitting around depression	
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M	length glenoid	38.40			
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	?	length glenoid	34.78 (est.)			
scapula	R	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M?	length glenoid	36.95			
scapula	L	glenoid cavity complete	1	) 30	under 15	glenoid epiphysis unfused			length 21.87			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
scapula	L	glenoid cavity complete	1	)	under 15	glenoid epiphysis unfused			length 25.67			
scapula	L	glenoid cavity complete	1	)	under 15	glenoid epiphysis unfused			length 27.14			
scapula	L	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M?	length glenoid	37.01 (est.)			
scapula	L	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M	length glenoid	37.77		2/3 of cavity shows evidence of bone destruction, unclear if this is pathological or post mortem damage	
scapula	L	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	F	length glenoid	30.88			very small coracoid process
scapula	L	glenoid cavity complete	1	)	15+	glenoid epiphysis fused	M	length glenoid	39.10		surface damage on inferior 1/2 glenoid may be post mortem	
scapula	?	fragment glenoid	1	)	?		?				uneven surface on glenoid - only part of cavity in articulation?, pitting & irregular growth on surface & around edge	
scapula	R	fragment glenoid	1	)	?		?				superior end has pitting & irregular growth on articular surface and lipping around edge, pitting & destruction of bone in hollow on costal surface between & below coracoid process and glenoid - 13.5 mm below notch	
scapula	?	fragment glenoid	1	)	?		?				pitting & irregular growth on centre of cavity	
scapula	?	fragment glenoid	1	)	?		?				1/3 glenoid only, glenoid flattened & slightly pitted, moderate lipping around edge	
scapula	?	fragment glenoid	1	)	?		?				coracoid 1/2 of glenoid only, marked pitting on dorsal 1/2 edge of cavity, 2 sinuses on dorsal edge	
scapula	?	fragment glenoid	1	)	?		?				coracoid end of cavity missing, marked pitting on cavity and lipping around edge	
scapula	?	fragment glenoid	1	)	?		?				coracoid end of cavity missing, very marked pitting on cavity and lipping around edge	
scapula	?	fragment glenoid	1	)	?		?				superior 1/2 glenoid, pitting in the centre of cavity	
scapula	?	fragment glenoid	34	)	?		?					
scapula	?	undiagnostic fragments	224	)								
humerus	L	fragments with distal end	2	)	under 17	epiphysis unfused						one with septal aperture
humerus	L	fragments with distal end	1	)	14+	epiphysis fused	F	width epicondyle	53.12			septal aperture
humerus	L	fragments with distal end	1	)	14+	epiphysis fused	F	width epicondyle	57.71			septal aperture
humerus	L	fragments with distal end	1	)	14+	epiphysis fused	M	width epicondyle	63.62			
humerus	L	fragments with distal end	1	) 20	14+	epiphysis fused	?	width epicondyle	58.79			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
humerus	L	fragments with distal end	14	)	14+	epiphysis fused					1 consisting of distal 1/4 but with trochlea and capitulum missing, has large sinus (18 x 12 mm) just superior to coronoid fossa on the anterior side. This sinus seems clearly pathological because the edges are smooth but there are no associated bony changes. Unfortunately articular surfaces are missing.	one with septal aperture
humerus	R	fragment with sternal end	1	)	14+	epiphysis fused	?	width epicondyle				septal aperture
humerus	R	fragment with sternal end	1	)	14+	epiphysis fused	?	width epicondyle	59.20			septal aperture
humerus	R	fragments with distal end	8	)	14+	epiphysis fused						
humerus	?	small fragments distal articulation	45	)								
humerus	?	shaft fragments	25	)								
humerus	R	proximal ends	1	)	under 17	head unfused						
humerus	R	diaphysis, distal end missing	1	)	c. 4	estimated full length		estimated full length 150 mm				
humerus	R	proximal 1/2	1	)	c. 4	estimated full length		estimated full length 140 mm				
humerus	?	detached head	1	)	14+	epiphysis fused	F	diameter head	41.56			
humerus	?	detached head	1	)	14+	epiphysis fused	F	diameter head	39.14			
humerus	?	detached head	1	)	under 17	epiphysis unfused					almost complete unfused head with most of perimeter missing has a semicircular line of deep pits covering an area about 20 X 25 mm. No other obvious bony change or alteration in profile	
humerus	?	detached head	3	)	14+	epiphysis fused						
humerus	?	detached head	5	)	under 17	head unfused						
radius	?	distal ends	6	)	16+	epiphysis fused						
radius	?	distal ends	1	)	c. 16-18	epiphysis fusing						
radius	?	fragments with heads and/or radial tuberosity	36	)	14+	epiphysis fused					1 fragment of head only with pitted depression in centre; one fragment of head tuberosity and upper shaft with very marked pitting in centre of head and possible lipping around base of head (perimeter of head damaged)	
radius	?	fragments with heads and/or radial tuberosity	4	) 22	under 17	epiphysis unfused						
radius	?	alcp	1	)	c. 4	estimated full length			estimated full length 100 mm			
radius	?	alcp	1	)	c. 6	estimated full length			estimated full length 130 mm			
ulna	L	fragments with radial notch	13	)	14+	epiphysis fused					3 with pitting and lipping of and around radial notch; 1 with gross destruction of radial notch	
ulna	L	fragments with radial notch	2	)	under 17	epiphysis unfused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
ulna	L	fragments with radial notch	16	)	?	unclear whether proximal epiphysis had fused						
ulna	R	fragments with radial notch	15	) 31	14+	proximal epiphysis fused					1 with slight lipping around radial notch	
ulna	R	fragments with radial notch	1	)	under 17	proximal epiphysis unfused						
ulna	R	fragments with radial notch	11	)	?	unclear whether proximal epiphysis had fused						
ulna	?	miscellaneous fragments proximal end	18	)								
ulna	?	fragments with distal end	6	)	15+	distal epiphysis fused						
ulna	?	unfused distal epiphysis	1	)	under 18	distal epiphysis unfused						
scaphoid	L	complete or alcp	14	)								
scaphoid	R	complete or alcp	18	)								
lunate	L	complete or alcp	13	)								
lunate	R	complete or alcp	21	)								
triquetral	L	complete or alcp	9	)								
triquetral	R	complete or alcp	11	)								
pisiform	?	complete or alcp	27	)								not sided
trapezium	L	complete or alcp	10	)								
trapezium	R	complete or alcp	14	)								
trapezoid	L	complete or alcp	16	)								
trapezoid	R	complete or alcp	18	)								
capitate	L	complete or alcp	12	)								
capitate	R	complete or alcp	23	)								
hamate	L	complete or alcp	11	)								
hamate	R	complete or alcp	13	)								
carpals	?	fragments	67	)								
1st metacarpal	L	complete or alcp	7	)	15+	epiphysis fused			57.25, 42.85, 44.79, 49.71, 40.53, 43.68			
1st metacarpal	R	complete or alcp	6	)	15+	epiphysis fused			49.07, 44.44, 38.36, 45.29			
1st metacarpal	?	fragments	27	)								
1st metacarpal	?	unfused proximal epiphysis	1	) 23	under 15	epiphysis unfused						
2nd metacarpal	L	complete or alcp	7	)	15+	epiphysis fused			none measurable			
2nd metacarpal	R	complete or alcp	9	)	15+	epiphysis fused			63.16, 69.22, 75.55, 67.60			
2nd metacarpal	?	fragments	9	)								
3rd metacarpal	L	complete or alcp	15	)	15+	epiphysis fused			69.85, 63.88, 72.40, 60.70, 66.40			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
3rd metacarpal	R	complete or alcp	17	)	15+	epiphysis fused			66.06, 61.67, 60.98			
4th metacarpal	L	complete or alcp	11	)	15+	epiphysis fused			57.63, 58.04			
4th metacarpal	R	complete or alcp	9	)	15+	epiphysis fused			60.62, 67.21, 61.09, 58.56			
5th metacarpal	L	complete or alcp	11	)	15+	epiphysis fused			51.76, 55.21		1 with lipping at proximal articulation	
5th metacarpal	R	complete or alcp	12	)	15+	epiphysis fused			49.85, 55.60, 55.08, 50.32, 48.53			
metacarpals	?	fragments	190	)								
proximal phalanges	?	complete or alcp	163	)	15+	epiphyses fused					1 with pitting & bone destruction on head	
middle phalanges	?	complete or alcp	130	)	15+	epiphyses fused						
1st distal phalanges	?	complete or alcp	30	)	15+	epiphyses fused						
distal phalanges	?	complete or alcp	77	)	15+	epiphyses fused						
proximal/ middle phalanges	?	complete or alcp	20	)	under 15	epiphyses unfused						
innominate	R	fragments with ischial tuberosity	13	)	20+	epiphysis for ischial tuberosity fused						most with part acetabulum
innominate	R	fragments with ischial tuberosity	5	)	under 20	epiphysis for ischial tuberosity unfused						
innominate	L	fragments with ischial tuberosity	5	)	20+	epiphysis for ischial tuberosity fused						
innominate	L	fragments with ischial tuberosity	2	)	c. 20	epiphysis for ischial tuberosity partly fused						
innominate	L	fragments with ischial tuberosity	2	)	under 20	epiphysis for ischial tuberosity unfused						
innominate	?	fragments with ischial tuberosity	8	)	20+	epiphysis for ischial tuberosity fused						
innominate	?	fragments with ischial tuberosity	1	)	under 20	epiphysis for ischial tuberosity unfused						
innominate	?	fragments with acetabulum	22	)								
innominate	?	fragments with greater sciatic notch	10	)								side unclear; too incomplete to assess sex
innominate	?	fragments with iliac crest	7	)	20+	iliac crest fused						
innominate	?	fragments with iliac crest	5	)	under 20	iliac crest unfused						
innominate	?	small undiagnostic fragments	140	)								
innominate	R	fragment with pubic symphysis	1	) 20	young adult?	Gilbert & McKern Stage 2	F	narrow medial ischiopubic ramus				
innominate	R	fragment with pubic symphysis	1	)	older adult?	Gilbert & McKern Stage 4	F	narrow medial ischiopubic ramus				

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
innominate	R	fragment with pubic symphysis	1	)	older adult?	Gilbert & McKern Stage 4	F	narrow medial ischiopubic ramus			marked scarring on ventral side	not a match for fragment with ventral scarring below
innominate	R	fragment with pubic symphysis	1	)	middle aged adult?	Gilbert & McKern Stage 3	F	narrow medial ischiopubic ramus				
innominate	R	fragment with pubic symphysis	1	)	22-24?	Todd's Phase III	M	broad medial ischiopubic ramus				
innominate	R	fragment with pubic symphysis	1	)	20-21	Todd's Phase II	M	broad medial ischiopubic ramus				
innominate	R	fragment with pubic symphysis	1	)	child?	surface very billowed	?					
innominate	L	fragment with pubic symphysis	1	)	middle aged adult?	Gilbert & McKern Stage 3	F	narrow medial ischiopubic ramus			marked scarring on ventral side	not a match for fragment with ventral scarring above
innominate	L	fragment with pubic symphysis	1	)	old adult?	Gilbert & McKern Stage 5	F	narrow medial ischiopubic ramus				
innominate	L	fragment with pubic symphysis	1	)	middle aged adult?	Gilbert & McKern Stage 3	F	narrow medial ischiopubic ramus				
innominate	L	fragment with pubic symphysis	1	)	45-50?	Todd's Phase IX	M	broad medial ischiopubic ramus				
innominate	?	small fragments of pubic symphysis	3	)	?		?					
femur	?	detached heads	5	)	17+	head fused	M	diameter head	47.67, 45.80, 48.18, 47.53, 47.00			
femur	?	detached heads	5	)	17+	head fused	M?	diameter head	45.11, 45.36, 45.19, 45.32, 45.01			
femur	?	detached heads	7	)	16+	head fused	?	diameter head	43.37, 44.05, 43.48, 43.99, 43.90, 43.94, 44.21,			
femur	?	detached heads	3	)	16+	head fused	F	diameter head	40.18, 41.00, 36.88			
femur	?	detached heads	6	)	16+	head fused	F?	diameter head	42.82, 42.99, 42.79, 42.74, 41.67, 41.47			
femur	?	detached heads	21	)	17+	head fused	?	not measurable				
femur	?	unfused heads	9	)	under 17	head unfused			42.46, 38.70, 39.14, 43.17, 39.25, 32.70, 29.19 (est.); 35.15			
femur	?	fragments with distal ends	14	)	under 17	distal ends unfused						
femur	?	miscellaneous fragments condyles	95	)		unclear whether distal epiphysis had fused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	fragments distal diaphysis	2	)	under 17	distal ends unfused						
femur	?	greater trochanter	3	)	under 18	greater trochanter unfused						
femur	?	fragments shaft	5	)	?						1 small fragment with callus formation and pitting - site of #?; 1 small fragment with callus formation, pitting and sinus - site of # with infection?	
femur	L	unfused distal epiphysis	2	)	under 17	distal end unfused						
femur	L	alcp	1	) 33	c. 1	estimated full length			estimated length 85			
femur	L	fragment with greater trochanter	5	)	16+	greater trochanter fused						
femur	L	fragment with greater trochanter and head	1	)	16+	greater trochanter and head fused	?	intermediate	43.34			
femur	L	fragment with greater trochanter	4	)	under 18	greater trochanter unfused						
femur	R	fragment with greater trochanter	2	)	16+	greater trochanter fused						
femur	R	fragment with greater trochanter and head	1	)	16+	greater trochanter and head fused	F?	diameter head	42.16			
femur	R	fragment with greater trochanter	4	)	under 18	greater trochanter unfused						
patella	L	complete or alcp	46	)								
patella	R	complete or alcp	35	) 46							3 with pitting/bone destruction/lipping	
patella	?	fragments	12	)							13 with pitting/bone destruction/lipping	
tibia	not sided	fragments with distal articulation	37		16+	distal epiphysis fused						
tibia	not sided	distal epiphysis	6		under 18	distal epiphysis unfused						
tibia	not sided	fragments with tibial plateau	37		16+	proximal epiphysis fused						
tibia	not sided	fragments with tibial plateau	6		?	unclear whether epiphysis had fused						
tibia	not sided	proximal epiphysis	21		under 20	proximal epiphysis unfused						
tibia	not sided	proximal shafts	13	8	immature							at least 8 immature individuals
fibula	L	fragments with distal end	12	)	16+	epiphysis fused						
fibula	L	fragments with distal end	7	)	under 18	epiphysis unfused						
fibula	L	fragments with distal end	2	)	c. 16-18	epiphysis fusing						
fibula	R	fragments with distal end	13	)	16+	epiphysis fused						
fibula	R	fragments with distal end	2	) 22	under 18	epiphysis unfused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
fibula	?	shaft fragments	5	)	immature	size						difficult to assess age but appear to be from young children
fibula	?	fragments with proximal end	7	)	16+	proximal epiphysis fused						
fibula	?	fragments with proximal end	2	)	under 20	proximal epiphysis unfused						
fibula	?	fragments with proximal end	2	)	c. 16-20	proximal epiphysis fusing						
1st cuneiform	L	complete or alcp	22	)								
1st cuneiform	R	complete or alcp	16	)								
2nd & 3rd cuneiforms	?	complete or alcp	113	)								not separated or sided
cuboid	L	complete or alcp	10	)								
cuboid	R	complete or alcp	16	)								
navicular	L	complete or alcp	30	)							3 with deep pits in articular facet for talus	
navicular	R	complete or alcp	24	)							1 has marked bone destruction in articular surface for talus and whole bone is porous	
navicular	?	fragments	28	)								
talus	R	complete or alcp	19	)								
talus	L	complete or alcp	33	)							1 with lipping around posterior, middle and anterior calcaneal surface; 1 with large osteophytic formation between head and trochlear surface of body, 20 mm long - 7 mm high, surface of osteophyte is pitted	
talus	?	fragments	57	)								
calcaneus	R	complete	1	)	under 15	epiphysis unfused			65.1			
calcaneus	R	complete or alcp	12	)	15+	epiphysis fused			76.47, 81.80, 75.50, 71.32, 81.99, 81.71, 77.66			
calcaneus	L	complete or alcp	15	)	15+	epiphysis fused			81.56, 79.38, 78.89, 72.29, 70.92			
calcaneus	?	fragments	53	)							1 with moderate osteophytes on heel	
tarsals	?	fragments	182	)								
1st metatarsal	R	complete	1	)	15+	epiphysis fused			69.19	179.64	marked lipping around the head	
1st metatarsal	R	complete	1	)	15+	epiphysis fused			64.98	172.57		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			58.38	161.48		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			58.36	161.44		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			57.98	160.81		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			62.18	167.86		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			61.59	166.87		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			57.72	160.37		
1st metatarsal	R	with bases	5									
1st metatarsal	L	complete	1	)	15+	epiphysis fused			58.36	161.44		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			66.85	175.71		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			60.25	164.62		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			67.15	176.21		

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st metatarsal	L	complete	1	)	15+	epiphysis fused			66.75	175.54		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			65.44	173.34		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			62.91	169.09		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			56.51	158.34		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			67.29	176.45		
1st metatarsal	L	with bases	3									
1st metatarsal	?	fragments	17	)								
1st metatarsal	?	distal 1/2	1	)	c. 15	distal epiphysis fusing						1st metatarsal with distal epiphysis
1st metatarsal	?	shaft	2	)	under 15	epiphysis unfused						
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			74.15	166.86		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			80.46	175.32		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			77.15	170.88		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			78.97	173.32		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			79.42	173.92		
2nd metatarsal	L	with bases	14	)	?							
2nd metatarsal	R	complete	1	)	15+	epiphysis fused			80.13	174.87		
2nd metatarsal	R	complete	1	)	15+	epiphysis fused			71.58	163.42		
2nd metatarsal	R	with bases	11	)	?							2 appear immature
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			61.35	149.71		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			71.63	163.48		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			74.07	166.75		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			66.92	157.17		
3rd metatarsal	L	with bases	14	)	?							
3rd metatarsal	L	alcp	2	)	under 15	epiphyses unfused						
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			71.74	163.63		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			75.25	168.34		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			63.52	152.62		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			67.46	157.90		
3rd metatarsal	R	with bases	12	)								
4th metatarsal	L	complete or alcp	2	)	under 15	epiphyses unfused			55.32			
4th metatarsal	L	with bases	16	)								
4th metatarsal	R	complete	1	)	15+	epiphysis fused			70.76	170.56		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			72.58	173.11		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			60.81	156.63		
4th metatarsal	R	complete or alcp	3	)	under 15	epiphyses unfused			49.99			
4th metatarsal	R	with bases	11	)								
5th metatarsal	L	complete	1	)	under 15	epiphyses unfused			52.60			not a match for immature below
5th metatarsal	L	complete	1	)	15+	epiphysis fused			68.10	163.97		total length used
5th metatarsal	L	complete	1	)	15+	epiphysis fused			69.77	166.11		total length used
5th metatarsal	L	complete	1	)	15+	epiphysis fused			69.19	165.36		total length used
5th metatarsal	L	complete	1	)	15+	epiphysis fused			75.04 (pathology)		with healed #, proximal 1/3	
5th metatarsal	L	with bases	17	)								
5th metatarsal	R	complete	1	)	under 15				55.12			not a match for immature above
5th metatarsal	R	complete	1	) 33	15+	epiphysis fused			72.44	169.52		total length used
5th metatarsal	R	complete	1	)	15+	epiphysis fused			62.97	157.40		total length used
5th metatarsal	R	complete	1	)	15+	epiphysis fused			72.69	169.84		total length used
5th metatarsal	R	complete	1	)	15+	epiphysis fused			72.93	170.15		total length used
5th metatarsal	R	with bases	12	)								
metatarsals	?	various fragments	172	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st proximal phalanges	?	complete or alcp	53	)	15+	epiphyses fused					2 with erosive lesions on base; 1 with lipping on head	
1st proximal phalanges	?	complete	4	)	under 15	epiphyses unfused						
1st proximal phalanges	?	proximal epiphysis	1	)	under 15	epiphysis unfused						
1st proximal phalanges	?	fragments head	2	)								
proximal phalanges	?	complete or alcp	81	)	15+	epiphyses fused					2 with mid-shaft #, 2 with avulsion #s in base, 1 with base severely eroded	
proximal phalanges	?	complete	2	)	c. 15	epiphysis fusing						
proximal phalanges	?	complete	3	)	under 15	epiphyses unfused						
middle phalanges	?	complete	40	)	15+	epiphyses fused						
1st distal phalanges	?	complete or alcp	31	)	15+	epiphyses fused					1 with lipping proximal articular surface	
1st distal phalanges	?	fragments distal end	6	)								
distal phalanges	?	complete	19	)	15+	epiphyses fused						
middle & distal phalanges	?	complete	1	)	15+	epiphyses fused					phalanges ankylosed, no other obvious pathology	
metacarpals/ metatarsals		fragments	60									
phalanges	?	fragments	238								1 with healed mid-shaft #	
general long bone	?	shaft fragments	5298									
			16913									

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
cranium (1)		fragmentary cranium w. parietals, frontal, occipital & temporals	1		under 17	basi-sphenoid, epiphysis occipital condyles unfused					area fine pitting (20 x 20 mm) upper anterior crown, right parietal	
cranium (2)		fragmentary cranium	1		older child?, under 25	basi-sphenoid unfused, open sutures					large area very marked porotic hyperostosis left parietal, few fragments right parietal + pitting/reactive growth in orbit	
cranium (3)		very fragmentary cranium	1		c. 18-25	M3 erupted, roots almost complete, unfused sutures	M?	very pronounced brow ridges			pitting & reactive growth in both orbits	very fragmentary, some parts obscured by concretion, some upper dentition, unclear which, found encased in soil w. atlas
temporal		fragment	1								marked thickening of cranial wall - thickness 9.90 mm compared w. 4.63 mm at sutural edge	
temporal		fragments	2								marked thickening pitting and reactive growth - cranial wall thickness 11.97 mm.	2 fragments probably from same individual, either same bone although fragments do not join, or from a pair of temporals
temporal		fragments	19								all with varying degrees of typical hyperostosis	all appear temporal
frontal		fragment	1								fine pitting on external surface but clear extra layers of bone when viewed in profile - cranial wall 8.18 at thickest (excluding frontal crest)	
frontal	L	orbit	2								gross reactive growth with thickening of orbit surface	
frontal	L	orbit	2								slight reactive growth in orbits	
frontal	R	orbit	1								slight reactive growth in orbit	
frontal	L	orbit	1								reactive growth/pitting in orbit	
frontal	?	fragments orbit	8								fine pitting in orbit	
cranium	?	fragments	2213									
temporal	L	petrous parts	17	)								includes petrous parts from craniums 1 & 2
temporal	R	petrous parts	20	) 22								includes petrous parts from craniums 1 & 2
temporal	?	petrous parts	9	)								
occipital	L	pars lateralis	1	)	child	unfused						) not a pair
occipital	R	pars lateralis	2	)2	child	unfused						) not a pair
occipital		basilar part	1		child	unfused						
occipital		basilar part	1		child	unfused						unclear whether pars lateralis were fused, but fragment appears immature
hyoid		body	2		younger adult	unfused						
maxillae	R	fragment	2	)								see dentition spreadsheet
maxillae	R	fragments	4	)								see dentition spreadsheet
maxillae	L	fragments	4	)								see dentition spreadsheet
maxillae	L	fragments	7	) 10								see dentition spreadsheet
maxillae	?	small fragments	7	)								with sockets but fragment too small to identify tooth sockets
mandible	R	fragments	6	)								see dentition spreadsheet

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
mandible	R	fragments	4	)								see dentition spreadsheet
mandible	L	fragments	5	)								see dentition spreadsheet
~~mandible~~	~~L~~	~~fragments~~	~~4~~	~~)~~								~~see dentition spreadsheet~~
mandible	central	fragment chin area	1	)								see dentition spreadsheet
mandible	?	small fragment	1	)	infant?	size, 2 small crypts						with sockets but fragment too small to identify tooth sockets
mandible	?	small fragments	4	) 17								with sockets but fragment too small to identify tooth sockets
mandible	?	small fragments body & ramus	15	)								
mandible	R	fragments w. head ramus	5	)								
mandible	L	fragments w. head ramus	1	)								
mandible	?	ramus	16	)								
mandible	R	fragments w. head ramus	4	)							1 with flattening & pitting	
mandible	R	fragments w. head ramus	3	)	immature	epiphysis for head unfused?						
mandible	L	fragments w. head ramus	3	)								
loose teeth		complete or alcp	3									see dentition spreadsheet
loose teeth		fragments roots/crowns	12									
loose teeth		complete or alcp	11									see loose teeth spreadsheet
loose teeth		fragments roots/crowns	26									
atlas		fragments w. facets for dens	6	)								
atlas		fragments unfused arches	2	)	under 7	arches unfused						
atlas		fragments w. facets	15	)								
atlas		fragments arches	7	)								
axis		alcp	1	)	25+	epiphyseal ring fused						superior/anterior part dens coloured green - contaminated w. copper ?
axis		complete or alcp w. dens	20	)	25+	epiphyseal rings fused					3 with lipping at dens	
axis		alcp	1	)	c. 7?	body fusing						epiphyseal ring unfused
axis		alcp	1	)	under 7	body unfused						
CV		alcp	2	)	25+	epiphyseal ring fused					2 articulating CVs with anterior & posterior lipping	articulating bones
CV		bodies only	3	)	25+	epiphyseal ring fused					all with lipping	
CV		alcp	2	)	under 25	epiphyseal ring unfused						2 articulating CVs, much younger than 25
CV		bodies only	2	)	under 25	epiphyseal ring unfused						2 articulating CVs, much younger than 25, same individual as above ?
CV		bodies only	2	)	under 25	epiphyseal ring unfused						
CV		some alcp, some bodies only	83	)	25+	epiphyseal ring fused						
TV		1 alcp, 3 bodies	4	)	25+	epiphyseal ring fused						4 articulating lower TVs
TV		alcp	3	)	25+	epiphyseal ring fused						3 articulating TVs
TV		alcp	2	)	c.8	bodies recently fused to arches						epiphyseal rings unfused
TV		alcp or bodies only	9	)	under 25	epiphyseal ring unfused						
TV		alcp or bodies only	71	)	25+	epiphyseal ring fused						

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
LV		bodies only	5	)	under 7	bodies unfused to arches						probably from the same individual
LV		bodies only	4	)	under 7	bodies unfused to arches						
LV		bodies only	2	)	under 25	unfused						articulating vertebrae
LV		bodies only	5	)	under 25	unfused						
LV		alcp + bodies	5	)	25+	epiphyseal rings fused					moderate lipping around bodies	
LV		alcp + bodies	46	)	25+	epiphyseal rings fused						
LV		3 fragmentary vertebra	3	) 23	25+	epiphyseal rings fused					gross overgrowth bone around edges of 3 VT, the longest 46 mm although damaged - dripping candle appearance - DISH?	3 articulating bones
sacrum		1st body	1	)	25+	epiphyseal rings fused						
sacrum		1st body & right ala	1	)	25+	epiphyseal rings fused	F?	width body = width ala				
sacrum		1st body	1	)	under 25	unfused, body unfused to 2nd						
sacrum		5th bodies	8	)								
sacrum		fragments	22	)								
coccyx		alcp & fragments	5	)								
VT		fragments bodies	136	)	25+	epiphyseal rings fused						
VT		fragments bodies	6	)	25+	epiphyseal rings fused					slight/moderate lipping round body edge	
VT		fragments bodies	17	)	under 25	unfused						
VT		bodies only	20	)	under 7	arches						
VT		fragment	1	)	c. 7	body fusing to arch						
VT		arches, processes, spines	17	)	under 3	unfused						
VT		arches, processes, spines	21	)	under 7	bodies						
VT		arches, processes, spines	675	)								
VT		arches, processes, spines	10	)							moderate lipping & pitting of facets - 2 with eburnation	
ribs		shaft fragments	508									
ribs		shaft fragments	8		infants	size					periosteal reaction on external surface	
ribs		shaft fragment	1								pitting superior & inferior edge external surface	
ribs		shaft fragment	1								callus formation = site of #	
ribs		fragments w. heads/tubercles	86		20+	epiphyses fused						
ribs		fragment w. head	1		c.24	head fusing						
ribs		fragments w. heads/tubercles	13		under 20	epiphyses fused						
ribs		sternal ends	11		immature	no ossification of costal cartilage						
ribs		sternal ends	5		young adults	slight ossification						
sternum		unfused segment	2		immature							unclear which segment - age under early adulthood
sternum		fragment inferior end	1									
scapula		fragments w. glenoid	13	)					none measurable			

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
scapula	L	fragments w. glenoid	2	)	under 18	unfused						
scapula	L	fragment w. glenoid	1	)	infant	size						
~~scapula~~	~~R~~	~~fragments w. glenoid~~	~~4~~	~~)~~	~~infant~~	~~size~~						
scapula		unfused coracoid process	2	) 12	under 15	coracoid unfused						
scapula		detached acromions	3	)	infant	size						
scapula		fragments acromions	4	)	16+	epiphyses fused						
scapula		various fragments	53	)								
clavicle		acromial end	3	)	19+	epiphysis fused						
clavicle		acromial end	1	)							healed # acromial 1/3 with some displacement	
clavicle		shaft	42	)								
clavicle		sternal ends	2	)	under 25	epiphysis unfused						
clavicle		sternal ends	2	) 6	17-30	fused						
clavicle		sternal ends	1	)	21+	epiphysis fully fused						
clavicle		alcp	2	)	infant	size			53 (est.)			
clavicle		alcp	1	)	infant	size			50 (est.)			
clavicle		fragments	3	)	infant	size			too incomplete to measure			
humerus		fragments detached head	7	)	18+	epiphysis fused						none measurable
humerus		fragments unfused head	3	)	under 20	epiphysis unfused						various ages, 1 young child, 1 older child, & 1 probably adolescent
humerus	R	fragments distal shaft	2	)	?							
humerus	R	distal end	1	)	14+	epiphyses fused	F	width epicondyle	56.13			septal aperture
humerus	L	fragments distal shaft	3	)	?							
humerus	L	distal end	1	)	14+	epiphyses fused	?	between male & female mean	59.95			small septal aperture
humerus	L	fragment distal end	1	)	14+	epiphyses fused						
humerus	R	proximal 1/3	1	)	c. 9	length, epiphysis unfused			250 (est.)			
humerus	L	proximal1/2	1	)	c.3-4	length			150 (est.)			
humerus	L	distal 1/4	1	)	c.3-4	width distal end			31.75			
humerus	R	distal 1/3	1	) 11	c.1 year	length			80 (est.)			
humerus	R	distal 1/3	1	)	foetus/ neonate	length			60 (est.)			
humerus	L	distal 1/2	1	)	neonate	length			65 (est.)			
humerus	L	distal 1/3	1	)	c.1 year	length			80 (est.)		fine pitting/reactive growth on shaft - periostitis?	
humerus	L	distal 2/3	1	)	c.1 year	length			80 (est.)			
humerus	L	distal 1/3	1	)	c.1 year	length			80 (est.)			
humerus		fragments distal end	8	)	14+	epiphyses fused						
humerus		fragments distal end	6	)	?	unclear whether epiphyses have fused						
humerus		distal epiphysis (capitulum)	1	)	under 17	epiphysis unfused						
radius		fragments w. head	7	)	14+	epiphyses fused						
radius		fragment unfused head	1	)	under 17	epiphysis unfused						

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
radius		fragments head	3	) 6	?	unclear whether epiphyses have fused						
radius		fragments w. radial tuberosity	5	)								1 with very marked attachment for biceps
radius	L	distal ends	6	)	16+	epiphysis fused						
radius		section shaft	2	)	foetus	length			40 (est.)			
ulna	R	fragments proximal end	2	)	14+	epiphysis fused						
ulna	R	fragments w. radial notch	10	)								
ulna	R	proximal 2/3	1	)	c.1 year	length			80 (est.)			
ulna	L	fragments proximal end	2	)	14+	epiphysis fused						
ulna	L	fragment proximal end	1	)	14-17	epiphysis fusing						
ulna	L	fragments w. radial notch	9	) 15								2 with marked muscle attachments for biceps
ulna	L	proximal 1/2	1	)	foetus	length			50 (est.)			
ulna	L	proximal 2/3	1	)	c. 6 months	length			70 (est.)			
ulna		small fragments proximal end	23	)								
ulna		fragments distal end	2	)	15+	epiphysis fused						
ulna		fragments distal end	2	)	?	unclear whether epiphyses have fused						
scaphoid	R	complete or alcp	5	)								
scaphoid	L	complete or alcp	8	)								
lunate	R	complete or alcp	5	)								
lunate	L	complete or alcp	2	)								
triquetral	R	complete or alcp	6	)								
triquetral	L	complete or alcp	3	)								
pisiform		complete or alcp	6	)								not sided
trapezium	R	complete or alcp	5	)								
trapezium	L	complete or alcp	5	)								
trapezoid	R	complete or alcp	6	)								
trapezoid	L	complete or alcp	4	)								
capitate	R	complete or alcp	12	)								
capitate	L	complete or alcp	11	)								
hamate	R	complete or alcp	6	)								
hamate	L	complete or alcp	5	)								
1st metacarpal	L	complete	1	)	15+	epiphysis fused			48.37			
1st metacarpal	L	head missing	1	)					not measurable			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			49.95			
1st metacarpal	R	base missing	1	)								
1st metacarpal		bases only	2	)	15+	epiphysis fused						
1st metacarpal		unfused proximal epiphysis	1	)	under 15	epiphysis unfused						
1st metacarpal	L	complete	1	)	under 15	epiphysis unfused			20.51			
2nd metacarpal	L	proximal 1/2 only	4	)								
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			68.51		pitting & reactive growth on proximal articular surface	

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
2nd metacarpal	R	proximal 1/2 only	4	)								
3rd metacarpal	R	proximal ends only	7	)								
~~3rd metacarpal~~	~~L~~	~~proximal ends only~~	~~6~~	~~) 12~~								
4th metacarpals	R	complete	1	)	15+	epiphysis fused			52.69			
4th metacarpals	R	proximal ends only	2	)								
4th metacarpals	L	proximal ends only	5	)							1 with healed # just distal to the base	
5th metacarpal	R	complete	1	)	15+	epiphysis fused			54.27			
5th metacarpal	R	complete	1	)	15+	epiphysis fused			53.73			
5th metacarpals	R	proximal ends	9	)								
5th metacarpals	L	proximal ends	7	)								
metacarpals		fragments w. heads	24	)	15+	epiphysis fused						
metacarpals		distal end + shaft	1	)	under 15	epiphysis unfused						
metacarpals		fragments shafts	36	)								
1st proximal phalanx		complete or alcp	6	)	15+	epiphysis fused						
proximal phalanges		complete or w. bases intact	42	)	15+	epiphysis fused						
proximal phalanges		unfused epiphyses	5	)	under 15	epiphyses unfused						
proximal phalanx		complete	1	)	under 15	epiphysis unfused						
middle phalanges		complete or w. bases	62	)	15+	epiphysis fused						
middle phalanges		complete or w. bases	4	)	under 15	epiphysis unfused						
1st distal phalanges		complete or w. bases	5	)	under 15	epiphyses unfused						
distal phalanges		complete or w. bases	22	)	under 15	epiphyses unfused						
distal phalanx		complete	1	)	under 15	epiphysis unfused						
distal phalanges		fragments	3	)								
phalanges		fragments	61	)								
innominate		fragments w. acetabulum	50	)								
innominate		fragments w. auricular surface	10	)								
innominate		fragments w. iliac crest	40	)	20+	iliac crest fused						
innominate		fragments w. iliac crest	9	)	under 20	iliac crest unfused						
innominate		unfused primary elements	9	) 11	under 15	unfused						
innominate	R	fragment w. sciatic notch	1	)			M	notch, no preauricular sulcus				
innominate	L	fragment w. sciatic notch	1	)			F	wide sciatic notch, preauricular sulcus				
innominate	L	fragment w. sciatic notch	1	)			F	wide sciatic notch, preauricular sulcus				
innominate		fragments w. sciatic notch	12	)								fragments too small to indicate sex
innominate		fragment w. pubic symphysis	1	)	45-50	Todd's Phase IX						
innominate		fragment w. pubic symphysis	1	)	35-39?	Todd's Phase VII?						
innominate		fragment w. pubic symphysis	3	)	?							fragments too small to estimate age

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
innominate		general fragments	23	)								
femur	R	head & neck	1	)	16+	epiphysis fused	F	diameter head	38.91			
femur	R	neck & upper shaft	1	)	16+							
femur	R	neck & upper shaft	1	)	16+							
femur	L	head & neck	1	)	16+	epiphysis fused	?F	diameter head	43.14			
femur	L	head & neck	1	)	16+	epiphysis fused	?M	diameter head	45.27			
femur	L	head & neck	1	)	16+	epiphysis fused	?	not measurable				
femur		detached head	1	)	16+	epiphysis fused	F	diameter head	39.07			
femur		detached head	1	)	16+	epiphysis fused	F	diameter head	40.01			
femur		detached head	1	)	16+	epiphysis fused	F	diameter head	39.10			
femur		detached head	1	) 16	16+	epiphysis fused	F	diameter head	40.50			
femur		detached head	1	)	16+	epiphysis fused	F	diameter head	37.33			
femur		detached head	1	)	16+	epiphysis fused	?F	diameter head	41.56			
femur		detached head	1	)	16+	epiphysis fused	?	diameter head	43.82			dimensions sexually indeterminate
femur		detached head	1	)	17+	epiphysis fused	M	diameter head	47.10			
femur		unfused head	1	)	under 18	epiphysis unfused	M	diameter head	46.32			
femur		unfused head	1	)	under 18	epiphysis unfused	?		38.16			
femur		unfused head	1	)	under 18	epiphysis unfused	?		24.35			
femur		distal 1/3	1	)	foetus/ neonate	length			65 (est.)			
femur		distal 1/3	1	)	c.1 year	length			96(est.)			
femur		proximal 1/2	1	)	c.1 year	length			110 (est.)			older than above
femur		fragments shaft w. epiphysis unfused	9	)	under 18	epiphysis unfused						
femur		fragments detached head	7	)	16+	epiphysis fused						
femur		fragments condyles	24	)	17+	epiphysis fused					1 with lipping around articular edge, 1 with eburnation & grooving	
femur		fragments condyles	3	)	under 19	epiphyses unfused						
femur		fragments condyles	21	)	?	unclear whether fusion had taken place						
patella	R	complete or alcp	12	)								
patella	L	complete or alcp	18	) 18								
patella		fragments	2	)								
tibia		fragments w. tibial plateau	38		16+	epiphysis fused						
tibia		epiphysis	7		under 20	epiphysis unfused						
tibia		fragment proximal end tibia	1		under 20	epiphysis unfused						
tibia	L	proximal 3/4 tibia	1		few months	length			60 (est.)			
tibia	L	proximal 1/2 tibia	1		few months	length						
tibia	?	distal 1/2 tibia	1		c. 6 months	length			65 (est.)			
fibula	R	distal ends	3	)	16+	epiphysis fused						
fibula	R	distal ends	2	)	?	unclear whether fusion had taken place						
fibula	R	distal epiphysis	2	)	under 18	epiphysis unfused						
fibula	L	distal ends	7	) 23	16+	epiphysis fused						

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
fibula	L	distal ends	4	)	?	unclear whether fusion had taken place						
fibula	L	distal epiphyses	2	)	under 18	epiphysis unfused						
fibula		fragment proximal end	1	)	16+	epiphysis fused						
fibula		proximal 1/2	1	)	foetus/ neonate	length			62 (est.)			
fibula		distal 1/3	1	)	foetus/ neonate	length			62 (est.)			
fibula		proximal 1/2	1	)	foetus	length			54 (est.)			
fibula		both ends missing	1	)	c.1 year	length			90 (est.)			
fibula		section shaft	1	)	neonate	length			65 (est.)		periostitis covering shaft	
fibula		section shaft	4	)	infants	size			not measurable			
talus	R	complete or alcp	12	)								
talus	L	complete or alcp	18	)							slight lipping around head & talal surface with slight irregularities over whole bone	
talus		fragments	29	)								
calcaneus	R	complete or alcp	4	)								
calcaneus	L	complete or alcp	7	)								
calcaneus		fragments	34	)								
cuboid	R	complete or alcp	8	)								
cuboid	L	complete or alcp	6	)								
cuboid		fragments	2	)								
1st cuneiform	R	complete or alcp	5	)								
1st cuneiform	L	complete or alcp	9	)								
2nd & 3rd cuneiforms		complete, alcp & fragments	37	)								
navicular	R	complete or alcp	11	)							1 with deep pit (6 x 6 mm) in centre of facet for head of talus	
navicular	L	complete or alcp	11	)								
navicular		fragments	11	)								
1st metatarsal	R	complete	1	)	15+	epiphysis fused			62.41	168.25		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			60.62	165.24		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			66.16	174.55		
1st metatarsal	R	distal 1/2	1	) 18								
1st metatarsal	L	alcp	3	)	15+	epiphysis fused						
1st metatarsal	L	alcp	1	)	15+	epiphysis fused			64.85	172.35		
1st metatarsal	L	alcp	1	)	15+	epiphysis fused			60.31	164.72		
1st metatarsal	L	alcp	1	)	under 15	epiphyses unfused						both proximal and distal epiphyses present
1st metatarsal	L	distal 1/2	1	)								
1st metatarsal		fragments head	4	)								
2nd metatarsal	R	complete	1	)	15+	epiphysis fused			77.40	171.22		
2nd metatarsal	R	proximal 1/3 only	1	)								
2nd metatarsal	R	proximal 1/3 only	1	)	young child	size						young child
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			82.09	177.50		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			67.95	158.55		
2nd metatarsal	L	proximal portions only	4	)								
3rd metatarsal	R	alcp	1	)	15+	epiphysis fused						
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			78.00	178.08		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			73.84	172.42		

Bone	Side	Completeness	No.	Min No.	Age	Ageing Criteria	Sex	Sexing Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
3rd metatarsal	R	distal ends missing	3	)								
3rd metatarsal	L	alcp	1	)	15+	epiphysis fused			not measurable			
3rd metatarsal	L	distal ends missing	5	)								
4th metatarsal	R	complete	1	)	15+	epiphysis fused			76.02	177.93		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			69.18	168.35		
4th metatarsal	R	distal ends missing	4	)								
4th metatarsal	L	distal ends missing	3	)								
5th metatarsal	R	distal ends missing	4	)								
5th metatarsal	L	alcp	1	)	15+	epiphysis fused			72.76	171.33		
5th metatarsal	L	alcp	1	)	15+	epiphysis fused			78.59	178.80		
5th metatarsal	L	distal ends missing	12	)								
5th metatarsal		fragments proximal end	3	)								
metatarsals		fragments w. head	17	)	15+	epiphysis fused						
metatarsals		undiagnostic fragments	45	)								
sesamoid		complete	1	)								
1st proximal phalanx		complete or w. bases	19	)	15+	epiphysis fused						
1st proximal phalanx		unfused epiphysis	1	)	under 15	epiphysis unfused						
1st proximal phalanx		complete or alcp	4	)	under 15	epiphysis unfused						
1st proximal phalanx		fragments	4	)								
proximal phalanges		complete or w. bases	31	)	15+	epiphyses fused						
proximal phalanx		alcp	1	)	15+	epiphysis fused					healed mid-shaft #, slight deviation	
middle phalanges		complete or w. bases	7	)	15+	epiphysis fused						
1st distal phalanges		complete or w. bases	7	)	15+	epiphysis fused						
1st distal phalanx		fragment	1	)								
distal phalanges		complete	2	)	15+	epiphysis fused						
phalanges		fragments	8	)								
general long bone		fragments	2152									includes some immature bones
			7941									

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal	L	with orbit	1		young adult?	size, coronal suture unfused					marked area of destruction central orbit, with reactive growth	
frontal	L	with orbit	1	)	older child?	size					reactive growth in orbit	
frontal	L	with orbit	1	)	adult?	size					reactive growth in orbit	
frontal	L	with orbit	1	)	child?	size					reactive growth and pitting in orbit	
frontal	L	with orbit	1	)	infant	size					fine pitting in orbit	
frontal	L	with orbit	1	) 8	infant	size					pitting in orbit	
frontal	L	with orbit	1	)	adult?	size						
frontal	R	with orbit	5	)	various							
frontal	R	with orbit	1	)	child?	size					reactive growth in orbit	
frontal	R	with orbit	1	)	infant	size					fine pitting in orbit	
frontal	R	with orbit	1	)	infant	size					reactive growth in orbit	
temporal	L	petrous parts	23	)								
temporal	R	petrous parts	20	) 30								
temporal	?	petrous parts	10	)								side not clear
temporal	?	fragments petrous parts	12	)								undiagnostic fragments
temporal	L	temporo-mandibular fossa	1								erosion of facet, much wider than normal, lipping around facet edge	arthritis of temporo-mandibular joint
malar	L	zygomatic arch	1								# arch with slight deviation, # line still visible, presence of sinus indicates infection	
general skull		fragments	2375									
general skull		fragments	2		very immature	thickness cranial wall, texture					fine sporadic pitting on external surface	
general skull		fragments	3		adult?	thickness cranial wall					fine pitting on external surface	
general skull		fragments	3		very immature	thickness cranial wall, texture					small holes in inner table, possibly pathological	
general skull		fragments	2		immature	thickness cranial wall, texture					reactive growth on internal surface, no pitting	
general skull		fragments	3		child	thickness cranial wall					classic raised reactive growth	anaemia?, thalassaemia?
mandible	L	part	11	)								see separate spreadsheet
mandible	R	part	5	)								see separate spreadsheet
mandible	?	fragment	2	) 11	infant	size						sockets too small to identify which
mandible	L	part ramus with condyles	4	)							1 with area of erosion, worn flat, slight lipping	one very immature
mandible	R	part ramus with condyles	5	)	various							
maxilla	R	part	5	)								see dentition spreadsheet
maxilla	L	part	2	) 6								see dentition spreadsheet
maxilla	?	small fragments	8	)								sockets but too small to identify
loose teeth		roots or small parts crown	64									too small to be diagnostic
loose teeth		complete or alcp	11									see loose teeth spreadsheet
ribs		fragments shaft	86		very immature	size						many very young, probably foetal: 2 with gnawing marks
ribs		fragments shaft	354		various							includes immature
ribs		sternal end	13		under 18	no ossification						
ribs		sternal end	2		young adult	slight ossification						
ribs		fragments with heads/tubercles	91		20+	epiphysis fused						
ribs		fragments with head/tubercle	1		c.20	epiphysis fusing						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
ribs		fragments with heads/tubercles	20		under 20	epiphysis unfused						some very immature
atlas		fragments with facet for dens	14	)							2 with slight lipping around facet, 1 with moderate lipping	
atlas		fragments arches only	13	)								
atlas		fragments with facets	17	)								
atlas		fragments with facets	5	)	under 4	elements arch unfused						
atlas		fragment with facets	1	)							large bony spur on right superior facet	
atlas		fragment with facets	1	)							L inferior facet has lipping pitting & irregular growth	
atlas		fragment with facets	1	)							L inferior facet has lipping pitting & irregular growth	
atlas		fragment with facets	1	)							both L facets pitted with irregular growth, fragment very porous	
atlas		fragment with facets	1	)							L superior facet has lipping pitting & irregular growth, very porous, inferior facet normal	
axis		fragments with dens	8	)							one with moderate lipping & eburnation on dens	
axis		fragments with dens	1	)	under 4	dens unfused to body						
axis		fragments with dens	1	)	c.4	dens fusing to body						
axis		fragments, no dens	7	)								
CV		fragments with body	36	)	25+	epiphysis ring fused						
CV		fragments with body	8	)	under 25	epiphysis ring unfused						
CV		body only	1	)	under 7	body unfused to arch						
CV		body only	2	)	c.25	epiphyseal ring fusing						
CV		body only	3	)	25+	epiphyseal ring fused					3 arcticulating CVs with gross lipping, pitting & reactive growth, bones very	3 articulating CVs
CV		body only	1	)	25+	epiphyseal ring fused					gross lipping, pitting & reactive growth, bone very porous	
TV		fragments with body	26	)	25+	epiphyseal ring fused						
TV		body only	2	)	25+	epiphyseal ring fused					2 arcticulating TVs with right anterior lipping, gives bodies appearance of being skewed	2 articulating TVs
TV		body only	1	)	25+	epiphyseal ring fused					lipping pitting and irregular growth, bone porous	
TV		fragments with body	2	)	under 25	epiphyseal ring unfused						
TV		fragments with body	7	)	c.7	bodies fusing to arch						
LV		fragments with body	16	)	25+	epiphyseal ring fused						
LV		fragments with body	3	)	c.25	epiphyseal ring fusing						
LV		fragments body	2	) 14	under 25	epiphyseal ring unfused						
LV		bodies only	5	)	c.7	bodies fusing to arches						at least 4 articulate
VT		body fragments	106	)	25+	epiphyseal ring fused						
VT		body fragment	1	)	25+	epiphyseal ring fused					fragment with moderate lipping & irregular growth, very porous	
VT		body fragments	3	)	25+	epiphyseal ring fused					fragments with moderate lipping	
VT		body fragments	22	)	under 7	bodies unfused to arches						
VT		body fragments	10	)	under 25	epiphyseal ring unfused						
VT		body fragment	1	)	c.25	epiphyseal ring fusing						
VT		arch fragment	32	)	under 3	arch halves unfused						some clearly foetal

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
VT		arch fragment	22	)	under 7	arches unfused to body						
VT		fragment with facets	10	)							fragments with lipping, pitting and/or reactive growth of facets	
VT		miscellaneous fragments	483	)								
sacrum		1st body	4	)	25+	epiphyseal ring fused						
sacrum		1st body	3	)	under 6	body unfused to costal elements						
sacrum		ala with small part 1st body	2	)	25+	epiphyseal ring fused						
sacrum		auricular surface	1	)	immature	billowed surface						
sacrum		fragments 2nd to 4th bodies	16	)	various	some fused, some unfused						
sacrum		fragments 5th body	3	)								
sacrum		fragments sacral crest	5	)								
coccyx		1st body	2	)								
clavicle		shaft fragments	25	)								
clavicle		shaft fragments	6	)	children	size						
clavicle	L	acromial ½	2	)	20+	epiphysis fused						
clavicle	L	acromial ½	1	)	under 20	epiphysis fused						
clavicle	R	acromial ½	2	) 4	20+	epiphysis unfused						
clavicle	R	acromial 2/3	1	)	c. 5	estimated full length			84 (est. full length)			
clavicle	R	acromial ½	1	)	c. 3-4	estimated full length			70 (est. full length)			
clavicle	L	sternal end	1	)	28+	epiphysis fully fused						
clavicle	L	sternal end	1	)	under 20	epiphysis not started to fuse						
clavicle	R	sternal end	1	)	under 20	epiphysis not started to fuse						
scapula	L	fragments with glenoid	6	)								
scapula	L	fragments with glenoid	1	)	under 18	glenoid epiphysis unfused						) matching pair
scapula	R	fragments with glenoid	1	)	under 18	glenoid epiphysis unfused						) matching pair
scapula	L	fragments with glenoid	1	) 12	15+	glenoid epiphysis fused	F	length glenoid	31			
scapula	L	fragments with glenoid	2	)								
scapula	L	fragments with glenoid	1	)	very immature	size			12			
scapula	L	fragments with glenoid	1	)	very immature	size			15			
scapula	?	fragments with glenoid	17	)								
scapula	?	general fragments	51	)								
scapula	?	acromial epiphyses	2	)	under 22	epiphysis unfused						
scapula	?	part acromion	1	)							gross flattening, lipping, pitting & eburnation anterior surface acromion near facet for clavicle. ?dislocation of acromio-clavicular joint - arthritis?	
scapula	?	coracoid process	2	)	under 15	process unfused						
humerus	?	fragments head	18	)	18+	epiphysis fused						
humerus	?	unfused heads	8	)	under 20	epiphysis unfused						
humerus	?	shaft fragments	16	)								
humerus	L	distal end	1	)	14+	epiphysis fused	F	epicondylar width	55			septal aperture

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
humerus	R	distal end	1	)	14+	epiphysis fused	F	epicondylar width	53			
humerus	R	distal end	1	)	14+	epiphysis fused	?		not measurable			septal aperture
humerus	R	distal end	1	)	14+	epiphysis fused			not measurable			septal aperture
humerus	?	fragments distal end	25	)	14+	epiphysis fused						
humerus	?	fragments distal end	3	) 13	under 17	epiphysis unfused						
humerus	R	distal 1/2	1	)	c.6 months	length			80 (est.)			
humerus	R	distal 1/3	1	)	foetus/neonate	length			60 (est.)			) possible pair
humerus	L	distal 1/3	1	)	foetus/neonate	length			60 (est.)			) possible pair
humerus	L	distal 1/3	1	)	foetus/neonate	length			70 (est.)			
humerus	L	distal 1/3	1	)	foetus/neonate	length			63 (est.)			
humerus	R	distal 1/2	1	)	foetus/neonate	length			70 (est.)			not a match for above
humerus	R	proximal 1/2	1	)	foetus/neonate	length			64 (est.)			
humerus	?	shaft fragments	3	)	neonate to 1 year	size intermediary between neonate & 1						
radius		fragments with head	14	)	16+	epiphysis fused					one with avulsion # of part of rim of head?	
radius		fragments with head	2	) 19	under 17	epiphysis unfused						
radius		shaft fragment	2	)	very immature	size						
radius		proximal 2/3	1	)	6 month foetus	length			40 (est.)			
radius		shaft fragments	7	)								
radius		distal end	5	)	17+	epiphysis fused						
ulna	R	fragments with radial notch	5	)	14+	epiphysis fused						
ulna	R	fragments with radial notch	2	)	under 17	epiphysis unfused						
ulna	R	proximal 1/3	1	)	foetus/neonate	length			60 (est.)			
ulna	R	proximal 1/3	1	)	neonate/infant	length			90 (est.)			
ulna	L	fragments with radial notch	8	) 14	14+	epiphysis fused						
ulna	L	fragments with radial notch	1	)	under 17	epiphysis unfused						
ulna	L	proximal 2/3	1	)	foetus/neonate	length			55 (est.)			
ulna	L	proximal 1/4	1	)	neonate/infant	length			70 (est.)			
ulna	L	proximal 1/3	1	)	foetus/neonate	length			66 (est.)			
ulna	?	small fragments of proximal	8	)								
ulna	?	shaft fragments	7	)								
ulna	?	distal ends	4	)	?	state of epiphyseal fusion unclear						
scaphoid	R	complete or alcp	11	)								
scaphoid	L	complete or alcp	4	)								
scaphoid	R	complete	1	)	immature	size						
scaphoid	?	complete	1	)	immature	size						
scaphoid	L	complete or alcp	4	)								
lunate	R	complete or alcp	5	)								
lunate	L	complete or alcp	7	)								
triquetral	?	complete or alcp	11	)								
pisiform	?	complete or alcp	4	)								
trapezium	R	complete or alcp	6	)								
trapezium	L	complete or alcp	9	)								
trapezoid	R	complete or alcp	6	)								
trapezoid	L	complete or alcp	7	)								
capitate	R	complete or alcp	7	)								

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
capitate	L	complete or alcp	2	)								
hamate	R	complete or alcp	4	)								
hamate	L	complete or alcp	8	) 13								
hamate		fragments hook	2	)								
1st metacarpal	L	complete	1	)	15+	epiphysis fused			43			
1st metacarpal	L	complete	1	)	c.15	epiphysis fusing			45			
1st metacarpal	L	alcp	1	)	15+	epiphysis fused			44			
1st metacarpal	R	complete or alcp	2	)	15+	epiphysis fused			44			only one measurable
2nd metacarpal	R	heads missing	4	)					not measurable			
2nd metacarpal	L	heads missing	6	)								
3rd metacarpal	R	heads missing	4	)								
3rd metacarpal	L	heads missing	8	)							one with damage to styloid process (?healed #)	
4th metacarpal	R	complete	1	)	15+	epiphysis fused			65.11			
4th metacarpal	R	heads missing	2	)								
4th metacarpal	L	complete	1	)	15+	epiphysis fused			60.84			
4th metacarpal	L	heads missing	2	)								
5th metacarpal	R	complete	1	)	15+	epiphysis fused			51.60			
5th metacarpal	R	head missing	1	)								
5th metacarpal	L	alcp	1	)	15+	epiphysis fused			49.20			
5th metacarpal	L	heads missing	3	)								
metacarpals		fragments	83	)								
1st proximal phalanges		complete or alcp	7	)	15+	epiphysis fused						
proximal phalanges		complete or alcp	47	)	15+	epiphysis fused						
proximal phalanges		complete or alcp	3	)	under 15	epiphysis unfused						
middle phalanges		complete or alcp	59	)	15+	epiphysis fused						
middle phalanges		complete or alcp	9	)	under 15	epiphysis unfused						
1st distal phalanges		complete or alcp	13	)	15+	epiphysis fused						
distal phalanges		complete or alcp	36	)	15+	epiphysis fused						
phalanges		fragments	94	)								
middle & distal phalanges		proximal ends	2	)	15+	epiphysis distal phalanx fused					bones ankylosed with slight overlap and deviation	
innominate		fragments with acetabulum	32	)								
innominate		fragments with iliac crest	18	)	20+	crest fused						
innominate		fragments with iliac crest	6	)	under 20	crest unfused						
innominate		fragment of iliac crest	1	)	under 20	crest unfused						
innominate		greater sciatic notch	2	)			M	narrow sciatic notch				
innominate		greater sciatic notch	2	)			F	wide sciatic notch				
innominate		fragment with ischial tuberosity	4	) 5								
innominate	R	fragment with pubic symphysis	1	)	old adult	component V Gilbert & McKern	F	wide subpubic angle			very marked muscle attachments internal side - childbirth scars?	
innominate	R	fragment with pubic symphysis	1	)	old adult 50+	Todd's Phase X	M	narrow subpubic angle				
innominate	?	part pubic symphysis	2	)	older adult	symphyseal face worn						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
innominate	?	part pubic symphysis	1	)	young adult	symphyseal face billowed						
innominate	?	general innominate fragments	36	)								
innominate	?	unfused elements	7	)	under 13	elements unfused			none measurable			
femur		heads	2	)	under 18	heads unfused			diameter 36			probable matching pair
femur		head & neck	1	)	16+	head fused	M	diameter head	49			
femur		head & neck	1	)	16+	head fused	?M	diameter head	45			
femur		detached head	1	)	16+	head fused	?	diameter head	44			
femur		detached head	1	)	16+	head fused	F	diameter head	40			
femur		detached head	1	)	16+	head fused	?	diameter head	44			
femur		detached head	1	)	16+	head fused	F	diameter head	40			
femur		detached head	1	)	16+	head fused	?M	diameter head	45			
femur		detached head	1	)	16+	head fused	F	diameter head	40			
femur		detached head	1	)	16+	head fused	?F	diameter head	43			
femur		detached head	1	)	16+	head fused	F	diameter head	39			
femur		detached head	1	)	16+	head fused	F	diameter head	41			
femur		detached head	1	)	16+	head fused	F	diameter head	38			
femur		fragments detached head	4	)	16+	head fused						
femur		fragments distal end	37	) 16	17+	epiphysis fused						
femur		fragments distal end	4	)	under 19	epiphysis unfused						
femur		unfused epiphysis greater	2	)	under 18	epiphysis unfused						
femur		proximal ends	2	)	under 18	epiphysis unfused						
femur		proximal ends	3	)	16+	epiphysis fused						
femur	L	proximal 1/2	1	)	neonate	length			83 (est.)			
femur	R	proximal 1/2	1	)	c. 1 year	length			90 (est.)			
femur	R	proximal 1/2	1	)	c. 6 months	length			75 (est.)			
femur	R	proximal 1/3	1	)	c. 1 year	length			90 (est.)			
femur	L	proximal 1/2	1	)	c. 6 months	length			80 (est.)			
femur	L	proximal 1/3	1	)	c. 2 years	length			130 (est.)			
femur	L	distal 2/3	1	)	c. 6 years	length			260 (est.)			) matching pair
femur	R	distal 1/3	1	)	c. 6 years	length			260 (est.)			) matching pair
patella	L	complete or alcp	11	)								
patella	R	complete or alcp	5	)								
patella	L/R	complete	2	) 12	immature	size			R = height 23.16, width 22.94			matching pair
patella	?	fragments	2	)								1 appears immature
tibia		fragments tibial plateau	32		16+	epiphysis fused						
tibia		fragments tibial plateau	7		under 20	epiphysis unfused						various ages
tibia		fragments distal end	3		16+	epiphysis fused						
tibia		fragments distal end	2		under 18	epiphysis unfused						
tibia	R	proximal 1/3	1		neonate/infant	length			78 (est.)			
tibia	R	proximal 1/3	1		c. 1 year	length			90 (est.)			
tibia	R	proximal 1/3	1		foetus/neonate	length			60 (est.)			
tibia	R	proximal 1/2	1		neonate	length			80(est.)			
tibia		distal 1/3	1		infant	length			75 (est.)			
tibia		distal 1/3	1		foetus/neonate	length			60 (est.)			
tibia		distal 1/3	1		8 month foetus	length						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
fibula	L	distal ends	6	)	16+	epiphysis fused						
fibula	R	distal ends	7	)	16+	epiphysis fused						
fibula	L	distal epiphysis	1	) 8	under 18	epiphysis unfused						
fibula	R	distal epiphysis	1	)	under 18	epiphysis unfused						
calcaneus	?	fragments	49	)								fragmentary, none complete, not sided
talus	R	complete or alcp	15	)								3 very immature; 1 with facet medial side between tibial surface & head
talus	L	complete or alcp	10	)							1 with gross destruction of head with osteophytes around head	1 very immature
talus	?	fragments	9	)								
navicular	R	complete or alcp	11	)								
navicular	L	complete or alcp	6	)							1 has lipping at facet for 3rd cuneiform	
navicular	?	fragment	7	)								
1st cuneiform	L	complete or alcp	8	)								
1st cuneiform	R	complete or alcp	6	)								
1st cuneiform	?	fragments	4	)								
cuboid	L	complete or alcp	7	)								
cuboid	R	complete or alcp	5	)								
cuboid	?	fragments	6	)								
2nd & 3rd cuneiforms	?	complete or alcp	62	)								not sided or separated into 2nd & 3rd
1st metatarsal	L	complete	1	)	15+	epiphysis fused			61.69	167.04		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			60.60	165.21		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			58.34	161.41		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			55.91	157.33		
1st metatarsals	R	alcp	2	)	15+	epiphysis fused						
1st metatarsals	R	proximal end missing	1	)								epiphysis for head present, fusing
1st metatarsals		fragments	7	)								
2nd metatarsal	L	complete	2	)	15+	epiphysis fused			70.50	161.97		
2nd metatarsal	R	head missing	1	)								
3rd metatarsal	L	head missing	4	) 15								
3rd metatarsal	R	head missing	2	)								
4th metatarsal	R	head missing	2	)								
4th metatarsal	L	head missing	2	)								
5th metatarsals	L	complete or alcp	7	)	15+	epiphysis fused			79.03	177.96		only one measurable; total length used
5th metatarsals	R	complete or alcp	5	)	15+	epiphysis fused			69.89	166.26		total length used
metatarsals	?	fragments	74	)								
1st proximal phalanges		complete or alcp	15	)	15+	epiphysis fused						
1st proximal phalanges		fragments	3	)								
1st proximal phalanx		complete	1	)	under 15	epiphysis unfused						
1st proximal phalanx		epiphysis	1	)	under 15	epiphysis unfused						
proximal phalanges		complete or alcp	53	)	15+	epiphysis fused						
proximal phalanges		complete	2	)	under 15	epiphysis unfused						
proximal phalanges		fragments	2	)	?							
middle phalanges		complete	16	)	15+	epiphysis fused						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st distal phalanges		complete or alcp	6	)	15+	epiphysis fused						
2nd to 5th distal phalanges		complete	2	)	15+	epiphysis fused						
phalanges		complete	3	)	15+	epiphysis fused					proximal, mid & distal phalanges fused into one, no clear evidence of bony change	
general long bone		fragments	1359									
general long bone		fragments	52		very immature	size/unfused epiphyses						
Total Identified Fragments			6945									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal w. orbit	R	orbit complete, R inferior frontal	1	)	adult?	thickness skull	?				area reactive growth upper orbit	
orbit	R	part upper orbit only	1	)	?						area reactive growth upper orbit	
frontal w. orbit	R	upper orbit, inferior R frontal	1	)	adult?	thickness skull	?				slight reactive growth in orbit	
orbit	R	part upper orbit only	1	)	?						slight reactive growth in orbit	
orbit	R	part upper orbit only	3	) 6	?		?					
orbit, part frontal	L	upper orbit w. small part frontal	1	)	?		?				pitting/reactive growth in orbit	
orbit	L	part upper orbit only	2	)	?		?					
orbit	L	part upper orbit only	1	)	infant	size						
orbit	R	orbit w. orbital edge missing	1	)	immature	size/texture					large pits in the superior/centre of orbit	
petrous part temporal	R	petrous part only	14	)								
petrous part temporal	L	petrous part only	12	) 18								
petrous part temporal	?	petrous part only	6	)								side unclear
occipital		unfused basilar part	1		under 6	unfused						
hyoid		unfused horns	2		- middle aged							
cranium		small fragments	1013		?							
cranium		small fragments	90		immature	cranial thickness						
cranium		small fragments parietal	2		immature	cranial thickness					raised, labyrinth-like lesions on external surface	
cranium		small fragments	7		immature	cranial thickness					raised, labyrinth-like or pitted lesions on external surface	
cranium		small fragments parietal	4		immature	cranial thickness					pitting on external surface	
cranium		small fragment parietal?	1		immature	cranial thickness					pitting/reactive growth on internal surface	
cranium		small fragment parietal? or frontal?	1		?						platelets/pitting in the internal surface - destruction of the internal table?. The trabeculae in the diploe appeal enlarged	
maxillae	L	fragments	7	)								see dentition spreadsheet
maxillae	R	fragments	3	) 7								see dentition spreadsheet
mandible	L	fragments	7	)								see dentition spreadsheet
mandible	C	fragments	4	)								see dentition spreadsheet
mandible	R	fragments	7	)								see dentition spreadsheet
mandible	L	heads/ramus only	5	)								
mandible	L	heads/ramus only	1	) 9	?						deep pit in articular area, extends into sub-cortical bone	
mandible	L	heads/ramus only	1	)	?						hollow w. pitting reactive growth on articular surface	
mandible	R	heads/ramus only	4	)	?							
mandible		undiagnostic fragments	18	)								
loose teeth		complete or alcp	11									see loose teeth spreadsheet
fragments loose teeth		undiagnostic fragments roots/crowns	84									
ribs		fragments shafts	389									
ribs		fragments shafts	5		immature/foetal?	size/texture						fine gnaw narks along length of fragments- some could be from the same individual
rib		fragment shaft	1		adult?	size					callous formation following #?	
rib		fragment shaft	1		immature/foetal?	size/texture					fine periosteal reaction on external superior part	
ribs		fragments sternal ends	19		immature							ossification, many very immature

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
ribs		fragments w. heads/tubercles	123		various							includes several from children, some foetal
ribs		fragments w. heads/tubercles	4		20+	tubercle epiphyses fused					pitting and lipping of tubercles	
sternum		small fragments	7									
atlas		complete	2	)	adult							
atlas		fragments w. facet for dens	7	)								
atlas		fragments arches/facets	9	)								
axis		alcp	2	)								
axis		detached dens	2	)								
axis		fragments	2	)								
CV		alcp	2	)	25+	epiphyseal ring fused						
CV		fragments w. bodies	29	)	25+	epiphyseal rings fused						
CV		body only	1	)	25+	epiphyseal ring fused					marked lipping & pitting both body surfaces, bone appears very porous	
CV		fragment body	1	)	25+	epiphyseal ring fused					marked lipping & pitting both body surfaces, bone appears very porous	
CV		bodies only	2	)	7- 8	body fused to arch but epiphyseal ring unfused, probable age, based on size						
CV		body only	1	)	c.7	body fusing to arch						
CV		arches	2	)	under 7	bodies unfused to arches						
TV		alcp	1	)	25+	epiphyseal rings fused						
TV		fragments bodies only	8	)	25+	epiphyseal rings fused						
TV		alcp	1	)	9 - 10	epiphyseal ring unfused, probable age, based on size						
TV		bodies only	4	) 11	under 25	epiphyseal rings unfused						
TV		body only	1	)	c.25	epiphyseal ring fusing						
TV		arches only	2	)	under 3	halves of arches unfused						
TV		fragment body	1	)	c.7	body fusing to arch						
LV		alcp	1	)	25+	epiphyseal ring fused						
LV		alcp	1	)	25+	epiphyseal ring fused					moderate to severe lipping around both edges of body	
LV		fragment body	1	)	25+	epiphyseal ring fused					moderate lipping around both surfaces of body	
LV		fragments bodies	15	)	25+	epiphyseal rings fused						
LV		fragments bodies	2	)	c.25	epiphyseal rings fusing						
LV		bodies only	4	)	under 25	epiphyseal rings unfused						
LV		body only	1	)	under 7	body unfused to arch						
VT		fragments bodies only	4	)	25+	epiphyseal rings fused					small fragments w. lipping on edge of bodies	
VT		fragments bodies only	3	)	c.25	epiphyseal rings fusing						
VT		fragments bodies only	16	)	25+	epiphyseal rings fused						
VT		bodies only	14	)	under 3	bodies unfused to arches						some probably foetal
VT		fragments arches, processes facets	276	)	various							
VT		fragment facet TV	1	)	adult	size					marked lipping and pitting	includes some very young individuals, some probably foetal
sacrum/coccyx		various fragments	45	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
clavicle	L	fragments w. conoid tubercle	12	)	various							
clavicle	R	fragments w. conoid tubercle	6	)	various							
clavicle	R	alcp, some damage to acromial end	1	)	under 25	epiphysis unfused						
clavicle	L	sternal end	1	) 12	25+	epiphysis fully fused						
clavicle	L	sternal end	3	)	under 25	epiphysis unfused						all appear full size
clavicle	?	sternal end	1	)	under 25	epiphysis unfused						
clavicle	R	sternal end	1	)	25+	epiphysis fully fused						
clavicle	?	shaft fragment	14	)								
scapula	L	fragment w. complete glenoid	1	)	15+	epiphysis fused	?	length glenoid sexually indeterminate	35.74			probably male appears robust
scapula	L	fragment w. complete glenoid	1	)	15+	epiphysis fused	F	length glenoid	31.97			
scapula	L	fragments w. part glenoid	5	)	15+	epiphyses fused						
scapula	L	fragment w. part glenoid	1	)	15+	epiphysis fused					reactive growth over articular surface	
scapula	L	fragment w. part glenoid	1	) 12	under 18	epiphysis unfused						
scapula	L	fragment w. part glenoid	1	)	15+	epiphysis fused	M	estimated length glenoid	43 (est.)			very robust
scapula	R	fragments w. part glenoid	3	)	15+	epiphyses fused						
scapula	?	unfused coracoid processes	2	)	under 18	unfused						one is very young
scapula	?	undiagnostic fragments	76	)								
humerus	L	fragment w. medial epicondyle & trochlea	8	)	14+	epiphysis fused	?					
humerus	L	distal 1/3	1	)	14+	epiphysis fused	?	epicondylar width sexually indeterminate	epicondylar width 60.49			
humerus	L	distal 1/4	1	)	14+	epiphysis fused	F	epicondylar width	56.35			septal aperture present
humerus	R	fragment w. medial epicondyle & trochlea	6	)	14+	epiphysis fused	?					
humerus	R	distal 1/4	1	)	14+	epiphysis fused	F	epicondylar width	57.50			small septal aperture
humerus	?	fragments shaft	26	) 17								
humerus	?	fragment w. medial epicondyle & trochlea	12	)								
humerus	L	fragment w. medial epicondyle & trochlea	1	)	14+	epiphysis fused	?				eburnation and grooving on capitulum, w. moderate lipping on the medial edge	
humerus	L?	proximal 1/2	1	)	neonate	estimated full length			estimated full length 66 mm			
humerus	R	proximal 1/3	1	)	neonate	estimated full length			estimated full length 60 mm			
humerus	?	fragments shaft, immature	2	)	children							
humerus	?	unfused heads	4	)	children various ages	size						
humerus	?	fragment head	?	)								
radius	L	proximal 1/2 w. head	2	)	14+	epiphysis fused						
radius	L	proximal 1/2 w. head detached	7	)	?							
radius	R	proximal 1/2 w. head detached	2	)	?							
radius	?	detached heads	6	)	14+	epiphysis fused						
radius	?	unfused head	1	)	under 14							
radius	?	fragment shaft w. tuberosity	1	)	?							
radius	?	fragment proximal end	1	)	under 14	epiphysis unfused						older child

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
radius	?	fragment proximal end	1	)	foetus	estimated full length			estimated full length 53 mm			
radius	?	proximal 1/2	1	) 15	6 month foetus	estimated full length			estimated full length 32 mm			
radius	?	fragment shaft	20	)								
radius	?	distal 1/2	1	)	7½ month foetus	estimated full length			estimated full length 38 mm			
radius	?	distal 1/2	1	)	8½ month foetus	estimated full length			estimated full length 45 mm			
radius	?	distal 1/2	1	)	c.2	estimated full length 80 mm						
radius	L	distal 1/2	1	)	16+	epiphysis fused						
radius	L	fragment distal end	2	)	16+	epiphysis fused						
radius	R	distal 1/3	2	)	16+	epiphysis fused						
radius	R	fragment distal end	2	)	16+	epiphysis fused						
radius	R	fragment distal end	1	)	under 16	epiphysis unfused						
radius	R	unfused distal epiphysis	1	)	under 16	epiphysis unfused						
radius	L	unfused distal epiphysis	2	)	under 16	epiphysis unfused						
ulna	L	proximal end w. radial notch	3	)	?							
ulna	L	proximal end w. radial notch	3	)	14+	epiphysis fused						
ulna	L	olecranon	4	)	14+	epiphysis fused						
ulna	L	proximal 1/4	1	)	under 14	epiphysis unfused						
ulna	L	proximal 2/3	1	)	c.3	estimated full length			estimated full length 108 mm			
ulna	L	proximal 1/2	1	)	c.3	estimated full length			estimated full length 108 mm			
ulna	L	proximal 2/3	1	)	foetus/ neonate	estimated full length			estimated full length 60 mm			
ulna	R	fragments w. radial notch	7	)	?							
ulna	R	fragments w. radial notch	3	) 11	14+	epiphysis fused						
ulna	R	fragments w. radial notch	1	)	under 14	epiphysis unfused						
ulna	R	fragment olecranon	1	)	14+	epiphysis fused						
ulna	R	proximal 2/3	1	)	foetus/ neonate	estimated full length			estimated full length 60 mm			
ulna	L	distal 1/2	1	)	15+	epiphysis fused						
ulna	R	fragments distal end	3	)	15+	epiphysis fused						
ulna	?	fragments distal end	8	)	15+	epiphysis fused						
ulna	R	unfused distal epiphysis	1	)	under 15	epiphysis unfused						
ulna	?	fragments shaft	24	)								
scaphoid	L	complete or alcp	8	)								
scaphoid	R	complete or alcp	6	)								
scaphoid	?	fragments	2	)								
lunate	L	complete	4	)								
lunate	R	complete or alcp	12	)								
triquetral	L	complete or alcp	7	)								
triquetral	R	complete	1	)								
pisiform	?	complete	14	)								
greater multanglar	L	complete	7	)								
greater multanglar	R	complete	4	)								
trapezoid	L	complete or alcp	8	)								
trapezoid	R	complete or alcp	6	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
capitate	L	complete or alcp	6	)								
capitate	R	complete or alcp	14	)								
capitate	?	fragment	1	)								
hamate	L	complete or alcp	5	)								
hamate	R	complete or alcp	4	)								
carpal	?	fragments	4	)								
1st metacarpal	L	complete	1	)	15+	epiphysis fused			46.91			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			48.58			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			44.70			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			46.99			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			44.23			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			42.06			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			41.23		slight lipping on medial side of head	
1st metacarpal	R	complete	1	)	15+	epiphysis fused			46.25			
1st metacarpal	R	head missing	1	)	15+	epiphysis fused						
1st metacarpal	R	bases missing	5	)	?							
1st metacarpal	R	complete	1	)	under 15	epiphysis unfused			38.34			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			73.34			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			60.39			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			68.11			
2nd metacarpal	L	head missing	1	)	?							
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			75.13			
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			71.09			
2nd metacarpal	R	heads missing	5	)	?							
2nd metacarpal	?	bases only, side unclear	2	)								
3rd metacarpal	L	alcp	2	)	15+	epiphysis fused						
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			70.42			
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			57.90			
3rd metacarpal	L	heads missing	4	)	?							
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			70.81			
3rd metacarpal	R	heads missing	9	)	?							
4th metacarpal	L	complete	1	)	15+	epiphysis fused			68.61			
4th metacarpal	L	heads missing	2	)	?							
4th metacarpal	R	complete	1	) 14	15+	epiphysis fused			47.52			
4th metacarpal	R	complete	1	)	15+	epiphysis fused			62.17			
4th metacarpal	R	heads missing	2	)	?							
5th metacarpal	L	complete	1	)	15+	epiphysis fused			52.57			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			50.88			
5th metacarpal	L	heads missing	5	)	?							
5th metacarpal	R	complete	1	)	15+	epiphysis fused			49.45			
5th metacarpal	R	complete	1	)	15+	epiphysis fused			50.18			
5th metacarpal	R	heads missing	4	)	?							
metacarpals	?	fragments	68	)								
metacarpal	?	fragment head & shaft	1	)	15+	epiphysis fused					slight lipping around head	
metacarpal	?	fragment head & shaft	1	)	15+	epiphysis fused					gross lipping on palmar surface below head (dorsal side damaged) large area of eburnation w. deep pits on head	
1st proximal phalanges	?	complete	7	)	15+	epiphysis fused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
proximal phalanges	?	complete or w. bases	49	)	15+	epiphysis fused						
proximal phalanx	R	complete	1	)	15+	epiphysis fused					'lump' of bone on the lateral side at the base of the head	
proximal phalanges	?	complete	2	)	under 15	epiphyses unfused						
proximal phalanx	?	proximal epiphysis only	1	)	under 15	epiphysis unfused						
middle phalanges	?	complete or w. bases	54	)	15+	epiphysis fused						
middle phalanx	?	complete	1	)	c.15	epiphysis fusing						
middle phalanges	?	complete	4	)	under 15	epiphyses unfused						
middle phalanx	?	complete	1	)	15+	epiphysis fused					slight lipping around proximal articulation	
middle phalanx	?	complete	1	)	15+	epiphysis fused					strange lesion on the palmar shaft, appears scooped away down its length w. some sporadic pitting, from the side view the bone appears thin, articular ends appear unaffected	lesion clearly premortem and pathological
1st terminal phalanx	?	complete or alcp	12	)	15+	epiphysis fused						
terminal phalanges	?	complete or alcp	40	)	15+	epiphysis fused						
terminal phalanx	?	alcp	1	)	under 15	epiphysis unfused						
phalanges	?	fragments shaft and/or head	78	)								
ilium	?	small fragments sciatic notch	10	)			?	small				
ilium	?	fragment w. crest	1	)	20+	iliac crest fused					osteophytes on crest, extend up to 4 mm	
ilium	?	fragment w. crest	1	)	under 20	iliac crest unfused						
acetabulum	?	small fragments	25	)								
acetabulum	?	small fragment	1	)							pitting and eburnation	
acetabulum	?	small fragment	1	)							marked area eburnation w. wide grooves	
ischium	L	complete	1	) 8	c. 1-2years	primary elements unfused, length			34 x 20			age based on Miles & Bulman 1995
ischium	R	tuberosity damaged	1	)	c. 5-7 years	primary elements unfused, length			49 x 35			age based on Miles & Bulman 1995
pubis	L	acetabular part missing	1	)	older adult	Gilbert & McKern Stage 4?	F	wide subpubic angle, ventral arc			pubic crest very enlarged, depression medial to crest - evidence of childbirth?	pulling on the pubic ligament
pubis	L	acetabular part missing	1	)	22-24	Todd, Stage V	M	narrow subpubic angle, no ventral arc				
pubis	L	part symphyseal face	1	)	young child	size/texture						
pubis	R	part symphyseal face	1	)	child	size						
pubis	R	part symphyseal face	1	)	young child	size						
pubis	?	small parts symphyseal face	3	)								
innominate	?	small undiagnostic fragments	39	)								
femur	L	head, neck & greater trochanter	1	)	16+	epiphyses fused	?M	diameter head	45.14			
femur	L	head, neck & greater trochanter	1	)	16+	epiphyses fused	?	diameter head sexually indeterminate	43.49			
femur	L	neck & lesser trochanter	1	)	16+	epiphyses fused	?					
femur	L	proximal ends	4	)	under 16	epiphyses unfused						
femur	R	proximal ends	3	)	under 16							
femur	?	detached head	1	)	16+	epiphysis fused	?	diameter head	44.88			
femur	?	detached head	1	)	16+	epiphysis fused	M	diameter head	50.89			
femur	?	detached head	1	) 11	16+	epiphysis fused	M	diameter head	47.55			
femur	?	detached head	1	)	16+	epiphysis fused	?	diameter head	43.33			
femur	?	detached head	1	)	16+	epiphysis fused	F	diameter head	38.70			
femur	?	detached head	1	)	16+	epiphysis fused	?	diameter head	43.63			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	detached head	1	)	16+	epiphysis fused	F	diameter head	41.12			
femur	?	fragments detached head	6	)	16+	epiphysis fused						
femur	?	unfused epiphysis greater trochanter	1	)	under 16	epiphysis unfused						
femur	?	fragments shaft	5	)								
femur	?	fragments distal end (condyles)	48	)								
femur	?	fragments distal epiphyses	4	)	under 16	epiphysis unfused						
patella	L	complete or alcp	14	)					35x35, 40x37, 46x41, 41x42, 39x37,36x34			width x height
patella	R	complete or alcp	14	) 16					35x34, 34 x35, 46x42, 37x36, 37x34			
patella	?	complete or alcp	4	)	children							
tibia	R	proximal 1/2	1		16+	epiphysis fused						bone x-rayed for Harris lines - nothing noted
tibia	R	proximal 1/2	1		16+	epiphysis fused						bone x-rayed for Harris lines - nothing noted
tibia	R	proximal end	2		under 16	epiphysis unfused						
tibia	L	proximal end	1		under 16	epiphysis unfused						
tibia	?	section shaft	1		?							bone x-rayed for Harris lines - nothing noted
tibia	?	fragments tibial plateau	33		16+	epiphysis fused						
tibia	?		4		under 16	epiphysis unfused						
tibia	R	fragment proximal end	2		under 16	epiphysis unfused						1 very young child, 1 older child
tibia	L	fragment proximal end	2		under 16	epiphysis unfused						1 very young child, 1 older child
tibia	?	shaft	2									
tibia	?	fragment distal end	7		16+	epiphysis fused						
tibia	?	fragments distal epiphysis	5		under 16	epiphysis unfused						
fibula	L	distal ends	8	)	16+	epiphysis fused						
fibula	R	distal ends	6	)	16+	epiphysis fused						
fibula	R	distal end	1	)	under 16	epiphysis unfused						
fibula	?	proximal ends	3	) 9	16+	epiphysis fused						
fibula	?	shaft fragments	36	)	various							some very immature, but fragments too small to estimate full length
talus	L	complete or alcp	16	)								
talus	R	complete or alcp	10	)								
talus	R	alcp	1	)							lipping around facet for calcaneus	
talus	?	fragments	8	)								
calcaneus	R	alcp	1	)					69.59			
calcaneus	R	fragments	2	)								
calcaneus	?	fragment	1	)	under 20	epiphysis unfused						
calcaneus	L	fragments	2	)								
calcaneus		small fragments	25	)								
navicular	R	complete or alcp	9	)								
navicular	R	alcp	1	)							deep pit in the centre of facet for talus	
navicular	L	complete or alcp	15	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
navicular	L	alcp	1	)							gross lipping at facets for 2nd & 3rd cuneiforms	
navicular	L	alcp	1	)							gross flattening, lipping & pitting of facet for 3rd cuneiform	
navicular	?	fragments	3	)								
cuboid	L	complete or alcp	4	)								
cuboid	R	complete or alcp	8	)								
cuboid	?	fragments	3	)								
first cuneiform	L	complete or alcp	8	)								
first cuneiform	R	complete or alcp	6	)								
first cuneiform	?	fragments	5	)								
second cuneiform	L	complete or alcp	10	)								
second cuneiform	R	complete or alcp	5	)								
third cuneiform	L	complete or alcp	8	)								
third cuneiform	R	complete or alcp	12	)								
cuneiforms	?	fragments	14	)								
1st metatarsal	L	alcp	5	)	15+	epiphysis fused						
1st metatarsal	L	complete	1	)	15+	epiphysis fused			63.65	170.33		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			58.06	160.94		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			57.89	160.66		
1st metatarsal	L	without proximal articulations	4	)	15+	epiphysis fused						
1st metatarsal	R	complete	1	)	15+	epiphysis fused			63.69	170.40		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			63.88	170.72		
1st metatarsal	R	alcp	3	)	15+	epiphysis fused						
1st metatarsal	R	complete	1	)	under 15	epiphysis unfused			37.45			
1st metatarsal	?	fragments	7	)								
2nd metatarsal	L	alcp	4	)	15+	epiphysis fused						
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			80.14	174.89		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			74.08	166.77		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			71.56	163.39		
2nd metatarsal	R	alcp	5	)	15+	epiphysis fused						
3rd metatarsal	L	all w. heads missing	5	)	?							
3rd metatarsal	L	w. heads damaged	2	)	15+	epiphyses fused						
3rd metatarsal	L	complete	1	)	under 15	epiphyses unfused			59.45			
3rd metatarsal	L	complete	1	)	under 15	epiphyses unfused			63.66			
3rd metatarsal	R	complete	1	)	15+	epiphyses fused			70.75	162.31		
3rd metatarsal	R	complete	1	)	15+	epiphyses fused			75.66	168.88		
3rd metatarsal	R	all w. heads missing	7	)	?							
4th metatarsal	L	all w. heads missing	7	)	?							
4th metatarsal	L	complete	1	)	under 15	epiphysis unfused			46.45			
4th metatarsal	R	complete	1	) 17	15+	epiphysis fused			66.29	164.31		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			63.59	160.53		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			67.18	165.55		
4th metatarsal	R	all w. heads missing	9	)	?							
5th metatarsal	L	all w. heads missing	9	)	?							
5th metatarsal	L	complete	1	)	15+	epiphysis fused			58.67	151.90		full length used
5th metatarsal	R	all w. heads missing	7	)	?	epiphysis fused			68.58	164.58		full length used
5th metatarsal	R	complete	1	)	15+	epiphysis fused						
metatarsals	?	fragments	61	)	?							
1st proximal phalanx	?	complete or w. proximal articulations	21	)	15+	epiphysis fused						
1st proximal phalanx	?	complete	1	)	under 15	epiphysis unfused						
1st proximal phalanx	?	fragments	2	)								
proximal phalanges	?	complete or w. proximal articulations	56	)	15+	epiphysis fused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
proximal phalanges		fragments w. heads/shafts	15	)								
proximal phalanges		complete	8	)	under 15	epiphysis unfused						
proximal phalanx		complete	1	)	c. 15	epiphysis fusing						
proximal phalanx		complete	1	)	15+	epiphysis fused						gnaw marks by a small animal all around shaft
proximal phalanx		complete	1	)	15+	epiphysis fused					head distorted, reactive growth proximal to head, base unaffected	
proximal phalanx		complete	1	)	15+	epiphysis fused					head distorted and pitted, reactive growth proximal to head, base unaffected	
proximal phalanx		complete	1	)	15+	epiphysis fused					'lump' (5X6 mm) of bone just distal to proximal articulation on dorsal surface, articular ends unaffected	
proximal phalanx		complete	1	)	15+	epiphysis fused					reactive growth (proliferative rather than periosteal) over whole of dorsal surface of shaft, plantar surface shaft & articular ends unaffected	
proximal phalanx		complete	1	)	15+	epiphysis fused					midshaft distortion, deep pit on plantar surface just distal to proximal articulation - healed fracture?	
middle phalanges		complete or alcp	23	)	15+							
middle phalanx		complete	1	)	15+	epiphysis fused					lipping around articulation	
middle phalanx		complete	1	)	under 15	epiphysis unfused						
1st terminal phalanx		complete or alcp	11	)	15+	epiphysis fused						
1st terminal phalanx		base only	1	)	15+	epiphysis fused					small area of eburnation on articular facet w. slight lipping	
1st terminal phalanx		head only	1	)								
terminal phalanges		complete or alcp	9	)	15+	epiphysis fused						
femur or humerus		fragments heads	83									
long bone		general long bone fragments	2520									
Total Identified Fragments			6554									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
frontal	R	small fragments upper orbit	4	)	adult?	size					
frontal	R	small fragments upper orbit	2	)	infants	size					
frontal	L	fragment upper orbit	1	)	older child?	size, texture				reactive growth in orbit with pitting	
frontal	L	fragment upper orbit	1	)	adult?	size				reactive growth in orbit with pitting	
frontal	L	fragment upper orbit	1	) 7	adult?	size					
frontal	L	fragment upper orbit	2	)	infant	size				reactive growth in orbit with pitting	
frontal	L	fragment upper orbit	1	)	young child	size				deep pits in socket with some reactive growth	
frontal	L	fragment upper orbit	1	)	infant	size					
frontal	C	small fragments	5	)							
malar	R	frontal process	6	)							
malar	L	frontal process	7	) 7							
malar	?	fragments	6	)							
zygomatic process	?	fragments	9								
petrous part temporal	R	petrous part only	12	)							
petrous part temporal	L	petrous part only	6	) 12							
petrous part temporal	?	small part petrous part	6	)							
temporal/mastoid area	?	small fragments mastoid area	26	)							
mastoid process	L	detached mastoid process	1	)			M	massive process			
mastoid process	R	detached mastoid process	1	) 2			M	massive process			probably not a match for above, therefore 2 males
mastoid process/external auditory meatus	R	fragment	1	)	child	size	?				
mastoid process	?	fragment	1	)	?		?				
occipital		small fragments	8								
occipital-lateralis		small fragments	8								
occipital-basilar part		complete	1		?	unfused					
occipital-basilar part		fragment	1		?	unfused					
cranium		small fragments	761		various						
cranium		small fragments	127		very young	thickness, texture					clearly immature fragments, some probably infant or foetal
fragment parietal		small fragment	2		young child	thickness, texture				additional labyrinth-like growth on external surface	possibly from the same individual
fragment cranium		small fragment	1		young child	thickness, texture				additional labyrinth-like growth on external surface	
fragments cranium		small fragments	2		infant	thickness, texture				fine pitting on external surface	possibly from the same individual
fragment cranium		small fragment	1		?					fine pitting on external surface	
maxilla	R	fragments	8	)							see attached sheet on dentition
maxilla	L	fragments	5	) 8							see attached sheet on dentition
maxilla	?	fragments	2	)							with tooth sockets but difficult to identify which ones
mandible	R	part right	1	)							see attached sheet on dentition
mandible	?	small fragments	22	) 1							undiagnostic
mandible	R	fragment head ramus	1	)						area of bone loss w. pitting on articular surface	
loose teeth	?	complete or alcp	40								see spreadsheet on loose teeth

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
loose teeth	?	fragments	49								undiagnostic fragments only
ribs	?	fragments	182		various						
ribs	?	fragments	41		immature						clearly immature, various ages
rib	?	small fragment shaft	1		?					periosteal reaction on both surfaces	no clear evidence of healed # but possible
sternum		unfused segment body	1		under 25	unfused manubrium					
atlas		unfused facet for dens	1	)	under 7	component part unfused					
atlas		fragment facet for dens	4	)	?						
atlas		fragments	8	)							
axis		body & dens	2	)							
axis		detached dens	2	)							
CV		fragments with bodies	6	)	under 25	epiphyseal rings unfused					
CV		fragments with bodies	19	)	25+	epiphyseal rings fused					
CV		fragments with bodies	2	) 5	25+	epiphyseal rings fused				lipping & irregular growth around bodies	articulating CVs
TV		fragments with bodies	3	)	25+	epiphyseal rings fused					
TV		fragment body	2	)	under 25	epiphyseal rings unfused					
LV		fragment body	1	)	25+	epiphyseal ring fused					
LV		fragment body	1	)	25+	epiphyseal ring fused				lipping & irregular growth around body	
VT		fragments body	13	)	25+	epiphyseal rings fused					
VT		unfused bodies	5	)	under 7	bodies unfused to arches					
VT		fragments body	3	)	under 25	epiphyseal rings unfused					
VT		fragments arches, processes	205	)	various						some clearly very immature
sacrum		fragments bodies	6	)							
coccyx		fragments	4	)							
scapula	R	fragment glenoid	1	)	15-18	glenoid epiphysis fusing					
scapula	?	fragments glenoid	6	) 4							undiagnostic - unmeasureable
scapula	?	undiagnostic fragments	29	)							
clavicle	?	undiagnostic shaft fragments	7	) 4							
humerus	R	proximal 1/3	1	)	c. 1 year	estimated full length			remaining length 25 mm		
humerus	R	distal shafts	3	)							
humerus	L	distal half	1	)	foetus/ neonate	estimated full length			remaining length 29 mm		
humerus	L	distal shaft	1	) 7							
humerus	?	shaft fragments	6	)							
humerus	?	fragments distal end	5	)							
humerus	?	fragment unfused head	1	)	adolescent	head unfused but appears full size					
humerus	?	fragment unfused head	1	)	child (c.5?)	size					
humerus	?	fragments head	3	)							
radius	L	fragments shaft with tuberosity	4	)	?	head missing					
radius	R	fragments shaft with tuberosity	2	)	?	head missing					
radius	?	fragments detached head	3	) 4							
radius	?	fragments shaft	2	)							

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
radius	?	fragment distal epiphysis	1	)	under 18	epiphysis unfused					
ulna	L	fragment proximal end	2	)	14+	epiphysis fused					
ulna	R	fragment proximal end	1	)	14+	epiphysis fused					
ulna	?	fragment proximal end	3	)	?						
ulna	L	fragment distal end	2	) 3	15+	epiphysis fused					
ulna	R	fragment distal end	1	)	under 15	epiphysis unfused					
ulna	?	fragments shafts	8	)							
pisiform	?	complete or alcp	11	)							
lunate	L	complete or alcp	5	)							
lunate	R	complete or alcp	5	)							
scaphoid	R	complete or alcp	5	)							
scaphoid	L	complete or alcp	5	)							
hamate	R	complete	1	)							
hamate	L	complete	5	)							
capitate	R	complete or alcp	4	)							
capitate	L	complete or alcp	4	)							
lesser multanglar	L	complete or alcp	5	)							
lesser multanglar	R	complete or alcp	3	)							
greater multanglar	R	complete or alcp	4	)							
greater multanglar	L	complete or alcp	1	)							
carpal	?	fragments	15	) 11							
1st metacarpal	R	proximal 1/2	1	)	15+	proximal epiphysis fused					
1st metacarpal	?	shaft only	1	)							
1st metacarpal	R	proximal 1/3	1	)	c. 15	proximal epiphysis fusing					
1st metacarpal	L	proximal 1/3	1	)	15+	proximal epiphysis fused					
1st metacarpal	L	proximal 1/3	1	)	c. 15	proximal epiphysis fusing					not a match for above
2nd metacarpal	R	alcp	1	)	15+	epiphysis fused					
3rd metacarpal	R	proximal 1/2	1	)							
4th metacarpal	R	proximal 2/3	11	)							
5th metacarpal	L	proximal 1/2	1	)							
metacarpals	?	heads only	6	)							
metacarpals	?	shaft fragments	21	)							
proximal phalanges	?	complete or alcp	23	)	15+						
proximal phalanges	?	unfused epiphyses	2	)	under 15	epiphyses unfused					
middle phalanges	?	complete or alcp	32	)	15+						
terminal phalanges	?	complete or alcp	23	)	15+						
phalanges	?	fragments	56	)							
ilium	?	fragments ilium - poor condition	26	)							
innominate	?	fragments acetabulum	14	)							
ilium	?	fragments sciatic notch	7	)			?	too small to identify sex			
ischium	?	fragments only	2	) 4							
pubis	?	small parts - poor condition	2	)	?						
pubis	?	pubic ramus	2	)							
femur	?	head & neck only	1	)	16+	head fused	M	diameter head	estimated diameter		

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Pathology	Comments
femur	?	head & neck only	1	)	16+	head fused	F	diameter head	estimated diameter		
femur	?	unfused heads	3	) 4	under 16	head unfused					
femur	?	unfused epiphyses greater trochanter	2	)	under 16	epiphyses unfused					
femur	?	small fragments distal end	13	)	?	unclear whether epiphyses had fused					
femur	?	shaft fragments	6	)							
patella	L	none complete	6	)							
patella	R	none complete	4	) 6							one with vastus notch, unclear whether the others have
patella	?	small fragment	1	)							
tibia	?	fragments tibial plateau	3		?	unclear whether epiphyses had fused					
tibia	?	shaft fragments	3								
fibula	L	distal ends only	2	)	16+	epiphysis fused					
fibula	L	distal end only	1	)	under 16	epiphysis unfused					
fibula	R	distal end only	1	) 4	16+	epiphysis fused					
fibula	?	shaft fragment	7	)							
fibula	?	shaft fragment	1	)	foetus?	size					
calcaneus	R	alcp	1	)							
calcaneus	?	fragments	8	)							
talus	?	fragments	8	)							
navicular	L	complete or alcp	3	)							
navicular	R	complete or alcp	4	)							
navicular	?	fragments	10	)							
1st cuneiform	L	complete	5	)							
cuneiforms (2nd & 3rd)	?	fragments	17	)							
1st metatarsal	?	fragments	9	)							
1st metatarsal	?	fragment	1	) 9	under 15	epiphysis unfused					
metatarsals	?	fragments	63	)							
1st proximal phalanx	R	alcp	1	)	15+	epiphysis fused					
1st proximal phalanx	L	complete	2	)	15+	epiphysis fused					
1st proximal phalanx	?	complete	1	)	under 15	epiphysis unfused					
1st proximal phalanx	?	complete	1	)	under 15	epiphysis unfused					not a match for above
1st proximal phalanx	?	fragments	8	)							
proximal phalanges	?	complete or alcp	35	)	15+	epiphysis fused					
middle phalanges	?	complete	12	)	15+	epiphysis fused					
1st terminal phalanges	?	complete or alcp	4	)	15+	epiphysis fused					
1st terminal phalanges	?	fragments	5	)	15+	epiphysis fused					
terminal phalanges	?	complete or alcp	3	)	15+	epiphysis fused					
middle/terminal phalanges	?	complete	2	)	15+	epiphysis fused				ankylosed	
phalanges	?	fragments	14	)							
Total Identified Fragments			2326								

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
cranium		fragment part frontal part both parietals, part L orbit	1	)	adult	sutures beginning to obliterate	?				marked cranial thickness over most of frontal - on average 10 mm, excluding frontal crest. Thickness over parietal bosses 5.6 mm. No change on external or internal surfaces. Diploe appears wider with large trabeculae & inner and outer table thicker. No pathology in orbit	
frontal		fragments with central brow	10	)								
frontal	R	fragment with R orbit	1	)							area destructive pitting in centre of orbit	
frontal	R	fragment with R orbit	1	)							fine pitting over orbit	
frontal	R	fragment with R orbit	1	)							raised area of proliferative growth in orbit	
frontal	R	fragments with R orbit	10	)								
frontal	L	fragment with L orbit	1	)							area of fine proliferative growth over orbit	
frontal	L	fragment with L orbit	1	)							area of pitting in upper orbit	
frontal	L	fragment with upper L orbit	1	)							possible pathology but orbit incomplete	
frontal	L	fragment with L orbit	1	) 28							area of pitting/destructive growth in orbit	
frontal	L	fragment with L orbit	1	)	child?	size, thickness					area of proliferative growth in upper orbit	
frontal	L	fragment with L orbit	1	)							possible pathology but orbit incomplete	
frontal	L	fragments with L orbit	2	)	infant?	size					possible pathology but very fine	
frontal	L	fragments with L orbit	3	)	infant?	size						
frontal	L	fragments with L orbit	16	)								
frontal	?	fragment of orbit	1	)	?						marked raised area proliferative growth, large trabeculae	
frontal	?	fragment of orbit	1	)	?						large area of pitting in orbit	
frontal	?	fragment of orbit	1	)	?						small area pitting in orbit	
frontal	?	fragment of orbit	2	)	?						area proliferative growth, large trabeculae	
frontal	?	fragment of orbit	1	)							small area pitting in orbit	
malar	R	fragments malar with frontal process	5	) 5								
malar	L	fragment frontal process	1	)	child? (but not infant)	size					marked periosteal reaction on external surface of frontal process - rest of malar missing	
temporal	R	fragment with mastoid process	1	)			M	very large process				
temporal	R	fragment with mastoid process	2	)			M	large processes				
temporal	R	fragment with mastoid process	2	)			?					
temporal	L	fragment with mastoid process	4	) 10			F	small processes				
temporal	L	fragment with mastoid process	2	)			M?	large processes				
temporal	L	fragment with mastoid process	1	)			?					
temporal	L	fragment with zygomatic process	1	)							fine pitting over external surface	
temporal	?	small fragments mastoid process	8	)								
temporal	R	petrous parts	7	)								
temporal	L	petrous parts	7	)								
temporal	R	petrous parts	40	) 51								
temporal	L	petrous parts	43	)								
temporal	?	petrous parts	10	)								
temporal	?	fragments petrous parts	5	)								
occipital		basilar part	2		under 25	unfused to sphenoid						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
occipital		pars lateralis	1		under 6	unfused to basilar part						
occipital		basilar part	2		under 6	unfused to pars lateralis						
occipital		basilar part	1		under 25	unfused to sphenoid						unclear whether fused to pars lateralis
occipital	R	pars lateralis	5		under 6	unfused to basilar part						
occipital	L	pars lateralis	4		under 6	unfused to basilar part						
parietal		fragments	10								fine pitting over external surface - otherwise normal	
occipital		fragments	3								fine pitting over external surface - otherwise normal	
cranium		fragments	8								fine pitting over external surface - otherwise normal	
parietal	L	fragment	1		child (not infant)	thickness					area of pitting towards posterior/central part	
parietal		fragment	1								fine pitting over external surface - dense thickened outer table. 8 mm	
parietal		fragment	1								diploe	
parietal		fragment	1								fine pitting on external surface, expanded diploe - 12 mm	
parietal		fragment	1								fine pitting on external surface, expanded diploe - 8.9 mm	
cranium		fragment	1								large pits external surface, expanded diploe, 10 mm very fine outer table	
cranium		small fragments	9								marked porosity on external surface, expanded diploe, no outer table, at least 6 fragments are parietal	
cranium		fragments	716									
cranium		fragments	3291									
hyoid		body	4		age	unfused to greater horns						
hyoid		greater horns	2		age	unfused to bodies						
hyoid		greater horns	2		middle-aged +?	fused to bodies						
mandibles	R	fragments	30	)								see dentition spreadsheet
mandibles	L	fragments	6	)								see dentition spreadsheet
mandibles	R/L	fragments	17	) 38								see dentition spreadsheet
mandible	?	small fragment with sockets, unclear which	1	)								
mandibles	R	fragments with head	18	)							1 with almost total destruction of head - flattened wear, marked lipping medial side; 1 with flattening of head with pitting + latero-medial expansion	
mandibles	L	fragments with head	17	)							1 with scooped out pitted area just posterior to articular surface; 1 with scooped out pitted area just lateral to articular surface & lipping lateral side of head (medial side damaged)	
mandibles	?	undiagnostic fragments	34	)								
maxillae	R	fragments	13	)								see separate spreadsheet
maxillae	L	fragments	10	) 14								see separate spreadsheet
maxillae	?	fragments	4	)								fragments with sockets but unclear which
loose teeth		various	21									see loose teeth spreadsheet
loose teeth		fragments	119									
atlas		complete	1	)								
atlas		fragment	2	)								

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
atlas		fragments with facets for dens	27	)							two have moderate lipping around facet for dens	
atlas		fragments facets/arches	69	)								
axis		complete or with dens	43	)							5 dens have slight lipping, one is at a strange angle - possible healed fracture?	While fracture-dislocation of the atlanto-axial joint is often fatal, if there is no displacement recovery is quite possible - Adams & Hamblen 1992.
axis		fragment body	3	)	under 25	unfused dens						
axis		small fragments	18	)								
CV		body only	96	)	+25	epiphyseal ring fused						
CV		body only	10	)	c.25	epiphyseal rings fusing						
CV		body only	1	)	?	unclear						
CV		body only	6	)	+25	epiphyseal rings fused					moderate lipping	
CV		body only	15	)	7-25	bodies fused to arches						
TV		body only	83	)	+25	epiphyseal rings fused						
TV		alcp	1	)	+25	epiphyseal rings fused					slight lipping	
TV		body only	2	)	+25	epiphyseal rings fused					slight lipping	
TV		alcp	1	)	c.25	starting to fuse						
TV		bodies only	7	)	c.25	starting to fuse						
TV		bodies only	3	)	7-25	bodies fused to arches						
TV		body only	1	)	c.7	body fusing to arch						
LV		bodies only	45	)	+25	epiphyseal rings fused						
LV		fragment body	5	)	+25	epiphyseal rings fused					slight lipping	
LV		fragment body	1	) 46	+25	epiphyseal rings fused					moderate lipping	
LV		fragment body	3	)	c.25	epiphyseal rings fusing						
LV		fragment body	2	)	under 25	epiphyseal rings unfused						
LV		bodies only	3	)	c.7	bodies fusing to arches						
LV		body only	1	)	under 7	body unfused to arch						
VT		fragments body	155	)	+25	epiphyseal rings fused						
VT		fragments body	2	)	+25	epiphyseal rings fused					moderate lipping	
VT		fragments body	2	)	rings fusing							
VT		fragments body	29	)	under 25	epiphyseal rings unfused						
VT		bodies only	3	)	c.7	bodies fusing to arches						
VT		bodies only	14	)	under 7	bodies unfused to arches						
VT		fragments arches, facets, spines	1249	)	various							includes some under 3, arches unfused
sacrum		1st body + fragments + part pelvis	2	)	young adult	1st body fusing to second, pelvic morphology	M	ratio 1st body to ala, pelvic morphology	width 1st body 51.4, width ala 43.16			articulating bones found encased in soil, see pelvis for further details
sacrum		two bodies	1	)	adult	bodies fused						
sacrum		first bodies	8	)	+25	but 1st not fully fused to						
sacrum		first bodies	5	)	+25	epiphyseal rings fused						unclear if 1st bodies had fused to 2nd
sacrum		first bodies	2	)	under 4	body unfused to arch						
sacrum		lower bodies	11	)	child?	unfused bodies						
sacrum		lower bodies	21	)								
sacrum		bodies	1	)	adult	all fused						
sacrum		coccyx bodies	7	)								
sacrum		fragments sacral crest	18	)								
sacrum		auricular surface	4	)								

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
ribs	?	fragments shaft	1124		various						1 fragment has evidence of a healed fracture	includes immature
ribs	?	fragments	214		children	size						
ribs	?	fragments with sternal end	15		under 18	cartilage						
ribs	?	fragments with sternal end	7		young adult	slight ossification						
ribs	?	fragments with sternal end	2		older adult	moderate ossification						
~~ribs~~	~~?~~	~~fragments with heads/tubercles~~	~~182~~		~~+20~~	~~epiphyses fused~~						
rib	R	fragment with head & tubercle	1		+20	epiphyses fused					gross distortion & enlargement of tubercles with irregular ossification & broadening of the whole bone - fracture? internal surface is unchanged although much broader	
rib	R	fragment with tubercle	2		+20	epiphyses fused					moderate lipping around tubercle	
rib	R	fragment with tubercle	1		+20	epiphyses fused					moderate lipping around tubercle with small area of eburnation	
rib		fragments with heads/ tubercles	17		under 20	epiphyses unfused						
sternum		fragments body	4									
scapula	L	fragment with glenoid cavity	1	)	15+	epiphysis fused	M	length glenoid	37.02			
scapula	L	fragment with glenoid cavity	1	)	15+	epiphysis fused	?	length glenoid	35.62			
scapula	L	fragment with glenoid cavity	1	)	15+	epiphysis fused	?	length glenoid	36.58			
scapula	L	fragment with glenoid cavity	1	)	15+	epiphysis fused	?	length glenoid	36.72			
scapula	L	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			22 (est.)			
scapula	L	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			24 (est.)			
scapula	L	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			24 (est.)			
scapula	L	fragment with inferior part glenoid cavity	13	)	?							
scapula	L	fragment with superior part glenoid cavity	6	)	15+	epiphysis fused						
scapula	R	fragment with glenoid cavity	1	)	15+	epiphysis fused	F	length glenoid	33.66			
scapula	R	fragment with glenoid cavity	1	) 32	15+	epiphysis fused	?	length glenoid	35.28			
scapula	R	fragment with glenoid cavity	1	)	15+	epiphysis fused	F	length glenoid	30.78			
scapula	R	fragment with glenoid cavity	1	)	15+	epiphysis fused	F	length glenoid	28.85			
scapula	R	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			15.31			
scapula	R	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			21.51			
scapula	R	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			18.16			
scapula	R	fragment with glenoid cavity	1	)	under 18	epiphysis unfused			23.84			
scapula	R	fragment with inferior part glenoid cavity	19	)	?							
scapula	R	fragment with superior part glenoid cavity	6	)	15+	epiphysis fused						
scapula	?	small fragments glenoid	42	)	?							
scapula	?	fragments with lateral extremity acromion	19	)	16+	epiphysis fused						
scapula	?	fragments with lateral extremity acromion	21	)	?							
scapula	?	fragments with lateral extremity acromion	6	)	under 22	epiphysis unfused						
scapula	?	fragments with coracoid process	17	)	15+	coracoid fused						
scapula	?	fragments with coracoid process	6	)	?							
scapula	?	unfused coracoid processes	7	)								

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
scapula	?	general undiagnostic fragments	273	)								
clavicle	L	fragments acromion end with conoid tubercle	21	)	?							
clavicle	L	fragments acromion end with conoid tubercle	5	)	immature	size						
clavicle	R	fragments acromion end with conoid tubercle	11	)								
clavicle	R	fragments acromion end with conoid tubercle	8	) 29								
clavicle	R	fragment both ends missing	1	)	immature	size						
clavicle	?	fragments sternal end	7	)	25+	epiphysis fully fused						
clavicle	?	fragments sternal end	1	)	20-25?	epiphysis 1/2 fused						
clavicle	?	fragment sternal end	1	)	25-28	epiphysis 5/6 fused						
clavicle	?	fragments sternal end	7	)	under 20?	epiphysis unfused						
clavicle	?	fragments diaphysis	45	)							one with healed # - no displacement	
humerus	?	fragments detached head	14	)	18+	epiphysis fused						none measurable
humerus	?	unfused heads	10	)	under 20	epiphysis unfused						
humerus	R	proximal 1/3	1	)	c. 2 1/2 years	estimated full length			est. full length 140			) matching pair
humerus	L	proximal 1/3	1	)	c. 2 1/2 years	estimated full length			est. full length 140			) matching pair
humerus	L	fragments proximal end	4	)	under 20	epiphysis unfused						
humerus	R	fragment proximal end	1	)	18+	epiphysis fused						
humerus	R	fragment proximal end	2	)	under 20	epiphysis unfused						
humerus	L	fragment with olecranon	1	)	14+	epiphysis fused	F	epicondylar width	epicondylar width 58.28			
humerus	L	fragment with olecranon	6	)	14+	epiphysis fused						4 with septal apertures
humerus	L	distal 1/2	1	)	7 month foetus	estimated full length			est. full length 40			
humerus	L	distal 2/3	1	)	c. 6 months	estimated full length			est. full length 80			
humerus	L	distal 1/3	1	)	c.5 years	estimated full length			est. full length 170			
humerus	R	fragment with olecranon fossa	1	) 17	14+	epiphysis fused	F	epicondylar width	epicondylar width 56.90			
humerus	R	fragment with olecranon fossa	1	)	14+	epiphysis fused	F	epicondylar width	epicondylar width 56.80			with septal aperture
humerus	R	fragment with olecranon fossa	1	)	14+	epiphysis fused	M	epicondylar width	epicondylar width 67.96			
humerus	R	fragment with olecranon fossa	1	)	14+	epiphysis fused	F	epicondylar width	epicondylar width 57.57			with small septal aperture
humerus	R	fragment with olecranon fossa	1	)	14+	epiphysis fused					pitting articular growth around articular surface & in olecranon	
humerus	R	fragment with olecranon fossa	4	)	14+	epiphysis fused						I with septal aperture
humerus	R	distal 3/4	1	)	c.5 years	estimated full length			est. full length 170			
humerus	R	fragment distal end	1	)	adolescent?	size						
humerus	R	distal 1/2	1	)	8 month foetus	estimated full length			est. full length 50			
humerus	R	distal 1/2	1	)	c. 2 years	estimated full length			est. full length 130			
humerus	R	distal 1/4	1	)	c. 2 years	similar size to above						
humerus	R	distal 1/4	1	)	c. 5 years	similar size to one with length 170						
humerus	?	small fragments with olecranon	8	)								
humerus	?	small fragments distal end	31	)	14+	epiphysis fused					1 with lipping around trochlea with eburnation	
humerus	?	unfused trochlea	4	)	under 17	epiphysis unfused						
humerus	?	unfused capitulum	1	)	under 17	epiphysis unfused						
humerus	?	fragments shaft	57	)								

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
radius	?	fragments with radial tuberosity	8	)	14+	epiphysis fused						1 right with very marked interosseous crest & oblique crest
radius	?	fragments with radial tuberosity	12	)	?							
radius	?	proximal 2/3	1	)	5 month foetus	estimated full length			est. full length 26			
radius	?	proximal 2/3	1	)	c. 2 years	estimated full length			est. full length 94			
radius	L	proximal 3/4	1	)	c. 5 years	estimated full length			est. full length 130			) matching pair
radius	R	proximal 1/4	1	)	c. 5 years	match for above						) matching pair
radius	?	proximal 2/3	1	)	foetus/ neonate	estimated full length			est. full length 50			
radius	?	proximal 1/2	1	)	c. 1.5 years	estimated full length			est. full length 86			
radius	?	proximal 1/2	1	)	c. 1.5 years	estimated full length			est. full length 80			
radius	?	proximal 2/3	1	)	c. 9 months	estimated full length			est. full length 70			) matching pair
radius	?	proximal 2/3	1	)	c. 9 months	estimated full length			est. full length 70			) matching pair
radius	?	fragments detached head	36	) 23	14+	epiphysis fused						
radius	?	unfused proximal epiphysis, complete	2	)	under 17	epiphysis unfused						
radius	?	fragment unfused proximal epiphysis	1	)	under 17	epiphysis unfused						
radius	L	fragments distal end	16	)	16+	epiphysis fused						
radius	L	fragment distal end	1	)	under 18	epiphysis unfused						
radius	R	fragment distal end	12	)	16+	epiphysis fused						
radius	?	small fragments distal end	13	)	16+	epiphysis fused						
radius	R	unfused distal epiphysis, complete	1	)	under 18	epiphysis unfused						) matching pair
radius	L	unfused distal epiphysis, complete	1	)	under 18	epiphysis unfused						) matching pair
radius	R	unfused distal epiphysis, complete	1	)	under 18	epiphysis unfused						) matching pair
radius	L	unfused distal epiphysis, complete	1	)	under 18	epiphysis unfused						) matching pair
radius	L	unfused distal epiphysis, complete	2	)	under 18	epiphysis unfused						
radius	R	unfused distal epiphysis, complete	3	)	under 18	epiphysis unfused						
radius	?	fragments unfused distal epiphysis	8	)	under 18	epiphysis unfused						
radius	?	diaphysis fragments	179	)							2 with very marked interosseous crests	2 with very marked interosseous crests
ulna	R	fragments with radial notch	10	)	14+	epiphysis fused						
ulna	R	fragments with radial notch	10	)	?						1 with gross distortion of proximal end (olecranon & semilunar notch missing) area inferior to radial notch is flattened, with a large depression and some deep pits, the radial notch is flattened & enlarged, the seminar notch and coronoid process is twisted medially = ?trauma ?#	
ulna	R	fragments with radial notch	1	)	under 17	epiphysis unfused						
ulna	R	proximal 2/3	1	)	6 month foetus	estimated full length			est. full length 37			
ulna	R	proximal 2/3	1	)	7-8 month foetus	estimated full length			est. full length 42			

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
ulna	R	proximal 1/3	1	)	2-3 years	estimated full length			est. full length 110			
ulna	R	proximal end	1	) 30	under 3	smaller than above						
ulna	R	proximal end	1	)	under 3	smaller than above						
ulna	R	fragments olecranon	13	)	14+	epiphysis fused						
ulna	L	fragments with radial notch	5	)	14+	epiphysis fused						
ulna	L	fragments with radial notch	1	)	under 17	epiphysis unfused						
ulna	L	fragments with radial notch	20	)	?							
ulna	L	fragments olecranon	11	)	14+	epiphysis fused						
ulna	?	small fragments olecranon	13	)	?							
ulna	?	fragments distal end	32	)	15+	epiphysis fused						
ulna	?	unfused distal epiphyses	3	)	under 18	epiphyses unfused						
ulna		diaphysis fragments	147	)	?							
lunate	L	complete or alcp	22	)								
lunate	R	complete or alcp	34	)								
scaphoid	L	complete or alcp	26	)								
scaphoid	R	complete or alcp	23	)								
scaphoid	?	fragments	9	)								
capitate	L	complete or alcp	24	)								
capitate	R	complete or alcp	22	)								
hamate	L	complete or alcp	22	)								
hamate	R	complete or alcp	23	)								
pisiform	?	complete or alcp	21	)								
greater multangular	L	complete or alcp	14	)								
greater multangular	R	complete or alcp	20	)								
greater multangular	?	fragment	4	)								
lesser multangular	L	complete or alcp	23	)								
lesser multangular	R	complete or alcp	15	)								
triquetral	?	complete or alcp	38	)								difficult to side
1st metacarpal	?	complete	4	)	+15	epiphysis fused			36.39			
1st metacarpal		heads missing	16	)	+15	epiphysis fused						
1st metacarpal	.	heads missing	2	)	c.15	epiphysis fusing						
1st metacarpal		complete	1	)	under 15	epiphysis unfused			15.20			very young child
1st metacarpal		shaft only	4	)								
1st metacarpal		head only	1	)								
2nd metacarpal	R	complete	2	) 34	+15	epiphysis fused			69.63, 74.49			
2nd metacarpal	L	complete	1	)	+15	epiphysis fused			64.80			
2nd metacarpal	?	heads missing	29	)	?							
3rd metacarpal	R	complete	2	)	+15	epiphysis fused			60.45, 70.70			
3rd metacarpal	R	heads missing	10	)	?							
3rd metacarpal	L	heads missing	2	)	?							
4th metacarpal	R	complete	3	)	+15	epiphysis fused			64.70, 56.79, 53.82			
4th metacarpal	R	head missing	1	)	?							
4th metacarpal	L	complete	1	)	+15	epiphysis fused			55.05			
4th metacarpal	L	head missing	9	)								
5th metacarpal	R	complete	1	)	+15	epiphysis fused			53.93			
5th metacarpal	L	heads missing	21	)	?							
metacarpals	?	fragments	215	)								shafts & heads
metacarpal	?	proximal 1/2	1	)	+15	epiphysis fused					shaft is very wasted, and waisted!, triangular in section midshaft, slight pitting on head	
1st proximal phalanges	?	complete	3	)	+15	epiphysis fused						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
proximal phalanges	?	complete or with proximal ends	129	)	+15	epiphysis fused						
proximal phalanx	1	alcp	1	)	+15	epiphysis fused					very marked medial & lateral muscle attachments, giving palmar surface a scooped out appearance, dorsal shaft has slight bulge - possible # site?	
proximal phalanges	?	complete	9	)	under 15	epiphysis unfused						
~~middle phalanges~~	~~?~~	~~complete or with proximal ends~~	~~178~~	~~)~~	~~+15~~	~~epiphysis fused~~						
middle phalanx	?	complete	1	)	+15	epiphysis fused						extensive gnawing all over shaft
middle phalanges	?	complete or with proximal ends	14	)	under 15	epiphysis unfused						
1st terminal phalanges	?		9		+15	epiphysis fused						
terminal phalanges	?	complete or with proximal ends	100	)	+15	epiphysis fused						
terminal phalanges	?	complete or with proximal ends	3	)	under 15	epiphysis unfused						
proximal phalanx?	?	shaft only	1								gross pathology of whole bone, internal & external - reactive growth, porosity, & 2 sinuses - infection?. No evidence of #	
phalanges	?	fragments	181	)								
ilium	?	fragments with iliac crest	43	)	20+	crest fused						
ilium	?	fragments with iliac crest	13	)	under 20	crest unfused						
ilium	?	fragment unfused iliac crest	1	)	under 20	crest unfused						
ilium	L	fragment with acetabulum & greater sciatic notch	1	)			M	narrow sciatic notch			moderate lipping around rim acetabulum	
fragment unfused ilium	L	fragment with auricular surface & greater sciatic notch	1	)	under 15	primary element unfused						
fragment unfused ilium	L	fragment with auricular surface & greater sciatic notch	1	)	under 15	primary element unfused						
ilium	L	fragment with auricular surface & greater sciatic notch	1	)			F	wide sciatic notch				
ilium	L	fragment with auricular surface & greater sciatic notch	1	)			?					
ilium	L	fragment with auricular surface & greater sciatic notch	1	)			M	very narrow sciatic notch				
ilium	L	fragment with auricular surface & greater sciatic notch	1	)			F	wide sciatic notch				
ilium	R	fragment with auricular surface & greater sciatic notch	1	)			F	very wide sciatic notch + preauricular sulcus				
ilium	R	fragment with auricular surface & greater sciatic notch	1	)			?					
ilium	R	fragment with auricular surface & greater sciatic notch	1	)			F	very wide sciatic notch				
ilium	?	fragments greater sciatic notch	4	) 17			M	narrow sciatic notch				
ilium	?	fragments greater sciatic notch	3	)			F	wide sciatic notch				
ilium		fragments greater sciatic notch	12	)			?					
innominate		fragments with acetabulum	71	)								
pubis	L	fragment with pubic symphysis	1	)	middle aged adult	Gilbert & McKern Stage 3	F	narrow medial aspect				
pubis	L	fragment with pubic symphysis	1	)	45-50	Todd Phase IX	M	broad medial aspect				
pubis	L	fragment with pubic symphysis	1	)	older adult	roughened surface pubic symphysis with well defined rim						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
pubis	R	fragment with pubic symphysis	1	)	older adult	roughened surface pubic symphysis with well defined rim	?					
ischium	L	fragments with ischial tuberosity	7	)	20+	epiphysis fused						
ischium	L	unfused ischium	1	)	under 15	primary elements unfused						
ischium	L	fragment with ischial tuberosity	1	)	under 20	epiphysis unfused						
ischium	R	fragments with ischial tuberosity	7	)	20+	epiphysis fused						
ischium	R	unfused ischium	1	)	c. 5-6	length ischium			length 48.40			
ischium	R	unfused ischium	1	)	c. 7	not measurable but slightly bigger than above						
ischium	R	unfused ischium	3	)	under 5	not measurable but smaller than one aged 5-6						
ischium	?	small fragments ischial tuberosity	4	)	20+	epiphysis fused						
ischium	?	small fragments ischial tuberosity	1	)	under 20	epiphysis unfused						
general fragments	?	fragments various unfused elements	10	)								
fragmentary pelvis		fragmentary pelvis with sacrum	1	)	young adult	Todd Phase 3, Suchey & Brooks Stage 3	M	short pubis, broad medial aspect				male sex also indicated by sacrum - see sacrum for details; numerous other small undiagnostic fragments
general undiagnostic fragments	?	small fragments	151	)								
femur	?	detached head	1	)	16+	head fused	F		38.06			
femur	?	detached head	1	)	16+	head fused	F		39.49			
femur	?	detached head	1	)	16+	head fused	F		39.44			
femur	?	detached head	1	)	16+	head fused	F		41.12			
femur	?	detached head	1	)	16+	head fused	F		40.52			
femur	?	detached head	1	)	16+	head fused	F		36.99			
femur	?	detached head	1	)	16+	head fused	F		37.31			
femur	?	detached head	1	)	16+	head fused	F		33.19			
femur	?	detached head	1	)	16+	head fused	F		40.43			
femur	?	detached head	1	)	16+	head fused	?		43.98			
femur	?	detached head	1	) 24	17+	head fused	M		45.83			
femur	?	detached head	1	)	16+	head fused	F		37.39			
femur	?	detached head	1	)	16+	head fused	F		39.65			
femur	?	detached head	1	)	17+	head fused	M		49.01			
femur	?	detached head	1	)	16+	head fused	F		40.73			
femur	?	detached head	1	)	17+	head fused	M		46.73			
femur	?	detached head	1	)	17+	head fused	M?		45.34			
femur	?	detached head	1	)	17+	head fused	M		50.93			
femur	?	detached head	1	)	16+	head fused	F?		42.92			
femur	?	detached head	1	)	16+	head fused	F		39.81			
femur	?	detached head	1	)	16+	head fused	F?		43.24			
femur	?	detached head	1	)	16+	head fused	F		37.80			

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	fragments detached head	18	)	16+	head fused	?				1 with very deep impression for fovea capitis - at least 24 mm long, 10 mm wide & 5 mm deep (damaged). Surface of the bone is very smooth apart from a few smooth rounded pits.	
femur	?	unfused head	1	)	under 18	head unfused	?		30.24			
femur	?	unfused head	1	)	under 18	head unfused	M		45.98			
femur	?	unfused head	1	)	under 18	head unfused	?		40.14			
femur	?	unfused head	1	)	under 18	head unfused	?		27.91			
femur	?	unfused head	1	)	under 18	head unfused	?		38.35			
femur	?	unfused head	1	)	under 18	head unfused	?		33 (est.)			
femur	?	fragments unfused heads	5	)								
femur	L	fragments proximal end	7	)	under 18	epiphyses unfused						
femur	R	fragments proximal end	5	)	under 18	epiphyses unfused						
femur	?	fragments proximal end	3	)	under 18	epiphyses unfused						
femur	?	fragments distal ends	65	)	?							
femur	?	fragments distal ends	6	)	16+	epiphysis fused						
femur	?	fragments unfused distal epiphysis	14	)	under 18	epiphysis unfused						
femur	?	unfused distal epiphysis	1	)	under 18	epiphysis unfused						
femur	?	fragments distal diaphysis	6	)	under 18	epiphysis unfused						
				)								
femur	?	shaft fragments	31	)								
patella	L	complete or alcp	28	)					33.73x33.14, 35.42x31.94, 45.14x40.62, 47.20x42.23, 43.39x42.33, 31.50x32.65, 38.17x30.05, 41.03x38.30, 41.10x?, 34.10x30.75, ?x37.79, 27.72x25(est.)			

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
patella	R	complete or alcp	34	) 36					46.18x41.95, 47.26x43.73, 38.12x38.28, 37.04x34.24, 42.83x36.95, 42.82x?, 38.73x40.16, 39.96x36.49, ?x36.48, 42.84x38.21, 49.84x43.14, 31.54x32.58, 40.58x?, ?x39.84, 43.07x39.72, 36.51x36.67, 42.90x?, 38.78x37.80, 38.36x?, 42.61x?, 30.59x?25.99x20.52		1 with 2 small erosive lesions on lateral facet & osteophytes on anterior surface	
patella	R	complete	1	)	child	size			21.65			) matching pair
patella	L	fragment	1	)	child	size						) matching pair
patella	?	fragments	5	)								
tibia	L	proximal 1/3	1		16+	epiphysis fused			69.27			
tibia	L	proximal 1/4	1		16+	epiphysis fused			67.40			
tibia	L	proximal 1/4	1		under 18	epiphysis unfused			53.05			
tibia	R	proximal end	1		16+	epiphysis fused			66.67			
tibia	L	proximal 2/3	1		foetus/ neonate	estimated full length			estimated full length 65 mm			
tibia	L	proximal 1/2	1		neonate	estimated full length			estimated full length 70 mm			
tibia	L	proximal 1/2	1		c. 1	estimated full length			estimated full length 100 mm			
tibia	L	proximal 1/2	1		c. 2	estimated full length			120 mm			
tibia	R	alcp	1		8 month foetus?	length			length 45 mm			
tibia	R	diaphysis	1		9 month foetus?	length			estimated full length 50 mm			
tibia	?	fragments with tibial plateau	79		16+	epiphysis fused						
tibia	?	fragments with tibial plateau	19		?							
tibia	R	unfused proximal epiphysis	1		under 18	epiphysis unfused			width proximal epiphysis 55.24			
tibia	?	fragments unfused proximal epiphysis	32		under 18	epiphysis unfused						
tibia	?	diaphysis fragments	39								1 L diaphysis with ensethopathic lesion along soleal line, more marked inferiorly	
tibia	L	distal ends	13		16+	epiphysis fused						
tibia	L	unfused distal epiphyses	6		under 18	epiphysis unfused						
tibia	R	distal ends	14		16+	epiphysis fused						
tibia	R	unfused distal epiphyses	2		under 18	epiphysis unfused						
tibia	?	fragments distal end	7		16+	epiphysis fused						
tibia	?	unfused distal epiphyses	4		under 18	epiphysis unfused						
fibula	L	fragments with distal end	8	)	16+	distal epiphysis fused						
fibula	L	distal 1/2 shaft	1	)	under 18	epiphysis unfused						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
fibula	L	unfused distal epiphysis	1	) 17	under 18	epiphysis unfused						
fibula	R	fragments with distal end	9	)	16+	distal epiphysis fused						
fibula	R	fragments with distal end	3	)	?							
fibula	R	unfused distal epiphyses	3	)	under 18	epiphysis unfused						
fibula	?	diaphysis fragments	88	)								
talus	L	complete or alcp	18	)								
talus	L	complete or alcp	2	)							osteophyte on posterior edge facet for calcaneus	
talus	L	complete	1	)							small area of erosion with pitting in facet for calcaneus; large linear erosive 'gouge' on superior surface, running diagonally from medio-inferior part of facet for calcaneus through internally and externally across later side convex surface for tibia through to lateral side of head. Internal bone appears greatly resorbed with various 'scoops' visible. Probably pseudopathology but possibly pathological. Part of the edges of the external surface appears recently broken but some edges appear remodelled.	
talus	L	complete or alcp	4	)	immature	size						
talus	R	complete or alcp	18	)								
talus	R	complete	1	)	immature	size						
talus	?	small fragments	27	)								
calcaneus	L	complete or alcp	8	)	15+	epiphysis fused			length - 79.71, 64.43, 66.70, 73.90		one with moderate lipping around superior part of facet for cuboid	
calcaneus	L	complete	1	)	under 15	epiphysis unfused						
calcaneus	R	complete or alcp	10	)	15+	epiphysis fused			length - 88.17, 80.93, 72.80, 63.78, 65.35			
calcaneus	R	complete	1	)	under 15	epiphysis unfused						
calcaneus	?	small fragments	61	)								
navicular	L	complete or alcp	23	)							1 with large osteophyte at margin of facets for 2nd & 3rd cuneiforms - the whole bone appears flattened and worn; 2 with moderate lipping around facet for 2nd cuneiform	
navicular	R	complete or alcp	29	)							1 with large osteophyte superior edge of facet for 1st cuneiform, moderate lipping at latero-medial edge of facet for 2nd cuneiform	
navicular	?	small fragments	16	)								
cuboid	L	complete or alcp	16	)								
cuboid	R	complete or alcp	15	)								
cuboid	?	fragments	4	)								
1st cuneiform	L	complete or alcp	25	)								
1st cuneiform	R	complete or alcp	23	)								
1st cuneiform	?	fragments	6	)								
2nd & 3rd cuneiforms	?	complete or alcp	126	)								
1st metatarsal	L	complete or alcp	4	)	15+	epiphysis fused						

Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st metatarsal	L	complete or alcp	1	)	15+	epiphysis fused			61.11	166.06		
1st metatarsal	L	complete or alcp	1	)	15+	epiphysis fused			52.66	151.87		
1st metatarsal	L	complete or alcp	1	)	15+	epiphysis fused			52.14	151.00		
1st metatarsal	L	complete or alcp	1	)	15+	epiphysis fused			54.78	155.43		
1st metatarsal	L	complete or alcp	1	)	15+	epiphysis fused			59.53	163.41		
1st metatarsal	L	base only	1	)	15+	epiphysis fused						
~~1st metatarsal~~	~~L~~	~~complete or alcp~~	~~2~~	~~)~~	~~?~~							
1st metatarsal	L	complete	1	)	under 15	epiphysis unfused			39.09			
1st metatarsal	R	complete or alcp	5	)	15+	epiphysis fused						
1st metatarsal	R	complete or alcp	1	)	15+	epiphysis fused			58.47	161.63		
1st metatarsal	R	complete or alcp	1	)	15+	epiphysis fused			57.67	160.29		
1st metatarsal	R	complete or alcp	1	)	15+	epiphysis fused			61.78	167.19		
1st metatarsal	R	complete or alcp	1	)	15+	epiphysis fused			62.87	169.02		
1st metatarsal	R	base only	1	)	15+	epiphysis fused						
1st metatarsal	R	bases missing	6	)	?							
1st metatarsal	R	alcp	1	)	under 15	epiphysis unfused						
1st metatarsal	?	fragments	23	)								
2nd metatarsal	L	alcp	1	)	15+	epiphysis fused						
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			67.46	157.90		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			70.65	162.17		
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			76.20	169.61		
2nd metatarsal	L	with bases	12	)	?						1 proximal 2/3 with marked thickening of shaft. ?# - if so spiral; ?infection but no surface change.	
2nd metatarsal	R	alcp	1	)	15+	epiphysis fused						
2nd metatarsal	R	alcp	1	)	15+	epiphysis fused			71.72	163.60		
2nd metatarsal	R	with bases	18	) 32	?							
3rd metatarsal	L	alcp	2	)	15+	epiphysis fused						
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			66.41	162.32		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			61.29	155.35		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			68.88	165.68		
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			67.14	163.31		
3rd metatarsal	L	with bases	9	)	?							
3rd metatarsal	L	complete	1	)	under 15	epiphysis unfused			46.34			
3rd metatarsal	R	with bases	17	)	?							
4th metatarsal	L	with bases	19	)	?							
4th metatarsal	L	complete	1	)	15+	epiphysis fused			69.91	169.37		
4th metatarsal	R	with bases	16	)	?							
4th metatarsal	R	complete	1	)	15+	epiphysis fused			65.42	163.09		
4th metatarsal	R	complete	1	)	under 15	epiphysis unfused			44.97			
5th metatarsal	L	with bases	13	)	?							
5th metatarsal	L	alcp	1	)	15+	epiphysis fused						
5th metatarsal	L	complete	1	)	15+	epiphysis fused			76.70	174.98		
5th metatarsal	L	complete	1	)	15+	epiphysis fused			76.46	174.67		
5th metatarsal	L	complete	1	)	15+	epiphysis fused			64.48	159.33		
5th metatarsal	R	with bases	16	)	?							
5th metatarsal	R	complete	1	)	15+	epiphysis fused			70.22	166.68		
5th metatarsal	R	complete	1	)	15+	epiphysis fused			69.08	165.22		
metatarsals	?	small fragments	216	)	?							
1st proximal phalanges	?	complete or with bases	51	)	15+	epiphysis fused					1 with area erosion/pitting in proximal articular facet, 1 with moderate lipping of proximal articular surface	

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Bone	Side	Completeness	No.	Min No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st proximal phalanges	?	complete	3	)	under 15	epiphysis unfused						
1st proximal phalanges	?	fragments	7	)	?							
proximal phalanges	?	complete or with bases	191	)	15+	epiphysis fused					1 with mid-shaft #	
proximal phalanges	?	complete	4	)	under 15	epiphysis unfused						
unfused epiphysis proximal phalanx	?	complete	1	)	under 15	epiphysis unfused						
proximal phalanges	?	fragments without bases	48	)	?							
middle phalanges	?	complete or with bases	66	)	15+	epiphysis fused					1 with marked lipping proximal facet	
middle phalanges	?	complete	2	)	under 15	epiphysis unfused						
1st terminal phalanges	?	complete or with bases	52	)	15+	epiphysis fused					1 with moderate lipping around proximal articular facet	
1st terminal phalanges	?	fragments without bases	2	)	?							
terminal phalanges	?	complete or alcp	18	)	15+	epiphysis fused						
middle & distal phalanges	?	complete	2	)	15+	epiphysis fused					2 middle & terminal phalanges ankylosed	
phalanges	?	fragments	51	)								
general long bone		undiagnostic fragments	4496									
		Total identified bones	12930									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal	R	fragments with orbit	29	)								no pathology
frontal		fragments with central brow	11	)								
frontal	L	fragments with orbit edge	24	)								
frontal	L	fragments with orbit	1	) 29							marked reactive growth in upper part orbit	
frontal	L	fragment with orbit	1	)							fine reactive growth in orbit	
frontal	L	fragment with orbit	1	)							fine pitting in orbit	
malar	R	fragments with frontal process	31	)								
malar	L	fragments with frontal process	23	) 31							1 fragment of frontal process with pitting on the external surface	
temporal	?	fragments with mastoid process	6	)	child	very small processes						
temporal	?	fragments with mastoid process	3	)			F?	medium sized processes				
temporal	?	fragments with mastoid process	3	)			M?	very large processes				
temporal	R	fragments with mastoid process	2	)	child?	very small processes						
temporal	R	fragments with mastoid process	6	)			F?	medium sized processes				
temporal	R	fragments with mastoid process	6	)			M?	very large processes				
temporal	L	fragments with mastoid process	8	) 26	child?	very small processes						
temporal	L	fragments with mastoid process	10	)			F?	medium sized processes				
temporal	L	fragments with mastoid process	5	)			M?	very large processes				
temporal	R	fragments with mastoid process	1	)	child	very tiny process						matching pair
temporal	L	fragments with mastoid process	1	)	child	very tiny process						matching pair
temporal		fragments with zygomatic process	31	)								
temporal	R	petrous parts	65	)								
temporal	L	petrous parts	72	) 72								
occipital		basilar parts	4		under 6	unfused basilar parts						
occipital		pars lateralis	5		under 6	unfused pars lateralis						
occipital		fragment with condyles	2		under 25?	epiphysis for condyles unfused						
occipital		fragments with condyles	17		17+?	condyles fused						
occipital		fragments with nuchal area	6									
occipital		fragments with nuchal area	7				M?	pronounced external occipital protuberance				

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
cranium		fragments	5								5 fragments with exceptional thickness - all parietal - 1 @ 9.51 with fine pitting on the external surface; tables appear to be of normal thickness; 1 @ 12.04, no pitting, tables appear normal but there is a circular lesion on the external surface 9.8 mm in diameter, bone remodelling on edge of lesion with pitting in the middle; 10.77 - no pitting tables appear normal; 1 @ 20 mm thick; 1 @ 14 mm thick	
cranium		fragments	15								bones (mostly parietal) appear normal but fine pitting on external surface.	
cranium		fragments	5		child	thickness					fine pitting on external surface	
cranium		fragments	3								at least 2 are parietal, exceptional thickness but diploe thickened and spongy with some large trabeculae - average thickness 10 mm	
cranium		fragments	10								10 fragments with raised honeycomb lesion - eg one is 9 mm thick at raised area, 3.5 mm on normal area	
cranium		general cranial fragments	4750									
hyoid		unfused body hyoid	9		under 25?	body unfused to horns						age of fusion variable
mandible	R	fragments with alveolar area	33	)								see dentition spreadsheet
mandible	L	fragments with alveolar area	31	)								see dentition spreadsheet
mandible	R/L	fragments with alveolar area	7	)								see dentition spreadsheet
mandible	?	fragments with sockets but too small to identify which	14	)								
mandible	R	fragments with ramus/condyles	33	) 33								
mandible	L	fragments with ramus/condyles	25	)							1 with erosive lesion in the centre of head, almost bifurcating it - raised 'bump' on posterior side head	
mandible	?	fragments condyles	4	)								
mandible	?	undiagnostic fragments	64	)								
mandible	?	fragments body	4	)								no alveolus
maxilla	R	fragments with alveolar area	16	)								see dentition spreadsheet
maxilla	L	fragments with alveolar area	20	) 17								see dentition spreadsheet
maxilla	?	fragments with sockets but too small to identify which	25	)								small fragments with sockets too small to identify
atlas		complete	2	)								
atlas		fragment with facets for dens of axis	23	)							2 with slight lipping; 1 with moderate lipping	
atlas		unfused parts neural arch	?	)	under 9?	arches unfused						
atlas		fragments neural arches/facets	87	)								
axis		fragments with dens	47	)							1 with slight lipping on dens; 2 with moderate lipping on dens	
axis		fragment with dens & body unfused	3	)	under 5?	elements unfused						
axis		fragment with unfused dens & body fusing	1	)	6-7 years	body fusing to arches						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
axis		fragment with unfused dens	1)		under 5?	dens unfused						unclear whether body has fused
axis		fragments	15)									
cervical vertebra		with bodies	174)		25+	epiphyseal rings fused					5 with slight lipping around body edges; 2 with moderate lipping	
cervical vertebra		with bodies	2)		c.7	body fusing to arch						
cervical vertebra		with bodies	2)		c. 25	epiphyseal rings fusing						
cervical vertebra		with bodies	14)		under 25	epiphyseal rings unfused						
thoracic vertebra		with bodies	148)		25+	epiphyseal rings fused					1 lower TV with very irregular body surfaces & Schmorl's nodes; 1 fragment with Schmorl's node inferior surface; 2 upper TVs with slight lipping inferior body surfaces; 5 with moderate lipping around body edges	
thoracic vertebra		with bodies	12)		c. 25	epiphyseal rings fusing						
thoracic vertebra		with bodies	7)		c. 7	bodies fusing to neural arches						
thoracic vertebra		with bodies	16)		under 25	epiphyseal rings unfused						
lumbar vertebra		bodies	2		25+	epiphyseal rings fused						found still in articulation encased in soil
lumbar vertebra		with bodies	84)		25+	epiphyseal rings fused					1 with slight lipping & Schmorl's node inferior surface; 1 with linear depression superior surface; 1 with Schmorl's node superior surface; 1 with moderate lipping edge superior surface; 4 with severe lipping	
lumbar vertebra		with bodies	5)		under 7	bodies unfused						
lumbar vertebra		with bodies	4)		c. 7	bodies fusing to neural arches						
lumbar vertebra		with bodies	7)		under 25	epiphyseal rings unfused						
lumbar vertebra		with bodies	8)	52	c. 25	epiphyseal rings fusing						
vertebrae		fragments bodies	246)		25+	epiphyseal rings fused					4 fragments with slight lipping around body edges; 6 with moderate lipping	
vertebrae		fragments bodies	4)		c. 25	epiphyseal rings fusing						
vertebrae		fragments bodies	3)		c. 7	bodies fusing to neural arches						
vertebrae		fragments bodies	19)		under 25	epiphyseal rings unfused						
vertebrae		bodies	40)		under 7	bodies unfused to neural aches						
vertebrae		miscellaneous fragments	2310)									
sacrum		1st bodies	3		25+	epiphyseal rings fused	M	width of bodies greater than ala				
sacrum		1st bodies	2		25+	epiphyseal rings fused	F	width of bodies less than ala				
sacrum		1st bodies	17)		25+	epiphyseal rings fused					1 with moderate/severe lipping superior edge	

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
sacrum		1st body	1	)	under 7	body unfused						
sacrum		1st body	1	)	c. 7	body fusing to arch						
sacrum		1st body	5	)	under 25	epiphyseal ring unfused						
sacrum		fragments middle bodies	36	)		fused?						
sacrum		middle bodies	5	)		unfused						
sacrum		5th bodies	5	)		fused?						
sacrum		5th bodies	4	)		unfused						
sacrum		various fragments	22	)								
coccyx		bodies	20	)								
ribs		fragments with tubercles/heads	363		20+	epiphyses fused					10 with slight lipping around tubercle; 10 with moderate lipping around tubercle; 1 with pitting/lipping of tubercle; 2 with pitting/lipping of head; 2 with slight lipping around head	
ribs		fragments with tubercles/heads	6		c. 20	epiphyses fusing						
ribs		fragments with tubercles/heads	80		under 20	epiphyses unfused						
ribs		shaft fragments	2148								1 with thickening shaft external surface, no evidence of # = infection?; 1with slight deviation of shaft = healed #; 1 with thickening of shaft, pitting superior edge & reactive growth inferior edge, some remodelling of bone both interior & exterior surfaces = #?	2 ribs fused together by pm concretion & fixer; 13 fragments possible pathology removed for further examination; 2 with gross ossification sternal end - most sternal ends either no ossification or only slight to moderate
sternum		1 alcp manubrium	1		under 25	manubrium unfused to body						
sternum		1 proximal part manubrium	1									
sternum		fragments inferior part of body	3									
sternum		unfused segments body	7		25	segments body unfused						
clavicle	R	fragments with acromial end	13	)								
clavicle	L	fragments with acromial end	14	)								
clavicle	R	fragment with sternal end	1	)	18	epiphysis fully unfused						
clavicle	R	fragment with sternal end	1	)	under 25	partial union of epiphysis						
clavicle	R	fragment with sternal end	1	)	25+	epiphysis fully fused						
clavicle	L	fragment with sternal end	1	)	18	epiphysis fully unfused						
clavicle	L	fragment with sternal end	1	) 15	25	epiphysis 3/4 fused						
clavicle	L	fragment with sternal end	1	)	25+?	epiphysis fully fused?					gross destruction of sternal articulation	
clavicle	?	sternal 2/3	1	)	c. 10	estimated full length			est. full length 100 mm			
clavicle	?	fragments shaft	5	)								
scapula	R	fragment with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	39			
scapula	R	fragment with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	41 (est)			
scapula	R	fragment with glenoid cavity	1	) 3	18	unfused			33 (est)			
scapula	L	fragment with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	40			
scapula	L	fragment with glenoid cavity	1	)	15+	glenoid epiphysis fused	M	length glenoid	38 (est)			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
humerus	R	proximal end	1	)	18+	epiphysis fused			43.81			
humerus	L	proximal 1/2	1	)	18+	epiphysis fused			45.97			
humerus	L	proximal end	1	)	18+	epiphysis fused			39.85			
humerus	R	proximal 1/2	1	)	c. 7	estimated full length			200			
humerus				)								
humerus	?	detached head	1	)	18+	epiphysis fused			42.94			
humerus		fragments detached head	14	)	?							
humerus		unfused heads	8	)	under 20	head unfused						
humerus	?	small fragments proximal end	2	)	under 20	epiphysis unfused						
humerus	L	proximal 1/3	1	)	under 20	epiphysis unfused						
humerus	L	proximal 2/3	1	)	c. 4	estimated full length			160 (est)			
humerus	L	proximal 1/2	1	)	c. 7	estimated full length			200 (est.)			
humerus	L	proximal1/2	1	)	c. 2	estimated full length			120 (est.)			
humerus	L	proximal 1/2	1	)	c. 4	estimated full length			150 (est.)			
humerus	R	distal 1/3	1	)	c. 3-4	estimated full length			140 (est.)			
humerus	R	distal 1/2	1	)	c. 4	estimated full length			160 (est.)			
humerus	R	distal ends	1	)	14+	epiphysis fused		epicondylar width	57.14			
humerus	R	distal ends	1	)	14+	epiphysis fused		epicondylar width	59.97			
humerus	R	distal ends	1	)	14+	epiphysis fused		epicondylar width	58.79			
humerus	R	distal ends	1	)	14+	epiphysis fused		epicondylar width	59.91			
humerus	R	distal ends	1	)	14+	epiphysis fused		epicondylar width	51.74			
humerus	R	distal ends	1	) 20	14+	epiphysis fused		epicondylar width	53.13			
humerus	R	distal ends	7	)	14+	epiphysis fused	?	not measurable				
humerus	R	distal ends	2	)	under 17	epiphysis unfused						
humerus	R	distal ends	1	)	birth-6 months	estimated full length			70			
humerus	R	distal ends	1	)	birth-6 months	estimated full length			70			
humerus	L	distal ends	1	)	14+	epiphysis fused		epicondylar width	55.33			
humerus	L	distal ends	1	)	14+	epiphysis fused		epicondylar width	59.33			
humerus	L	distal ends	1	)	14+	epiphysis fused		epicondylar width	66.17			
humerus	L	distal ends	1	)	14+	epiphysis fused		epicondylar width	55.8			
humerus	L	distal ends	1	)	14+	epiphysis fused		epicondylar width	55.9			
humerus	L	distal ends	1	)	14+	epiphysis fused		epicondylar width	52.09			
humerus	L	distal ends	7	)	14+	epiphysis fused	?	not measurable				
humerus	L	distal 1/3	1	)	c. 4	estimated full length			160 (est)			
humerus	?	distal 1/2	1	)	8 month foetus	estimated full length			50 (est.)			
humerus	?	small fragments distal end	44	)	14+	epiphysis fused						
humerus	?	fragments distal end	2	)	under 17	unfused						
humerus	?	unfused capitulum	2	)	under 17	unfused						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
humerus	?	unfused trochlea	6)		under 17	unfused						
humerus	?	fragments shaft	121)									
radius	?	fragments with head	40)		14+	epiphysis fused						
radius	?	fragments with radial tuberosity	39)	23								
radius	?	fragments with head	3)		c. 14-17	epiphysis fusing						
radius	?	unfused distal epiphyses	2		under 18	epiphysis unfused			lengths: 36, 28			
radius	R	fragment distal end	1		under 18	epiphysis unfused						
ulna	R	fragments with proximal end	32)		15+	epiphysis fused						
ulna	R	fragments with proximal end	7)		?							
ulna	R	fragment proximal end & shaft	1)		15+	epiphysis fused					slight lipping around semilunar notch and on epiphysis	
ulna	R	fragment proximal end & shaft	1)		15+	epiphysis fused					slight lipping around semilunar notch	
ulna	L	fragments with proximal end	13)		15+	epiphysis fused						
ulna	L	fragments with proximal end	13)	43	?							
ulna	L	fragment proximal end	1)		15+	epiphysis fused					area of bone destruction in semilunar notch & slight lipping superior part olecranon process	
ulna	L	fragment proximal end & upper shaft	1)		15+	epiphysis fused					lipping superior part olecranon	
ulna	L	fragment proximal end	1)		15+	epiphysis fused					slight lipping around semilunar notch and on posterior side olecranon process	
ulna	L	fragment inferior part head	1)		?						eburnation inferior part semilunar notch, proximal part missing	
ulna	?	fragments distal end	3)		15+	epiphysis fused						
ulna	?	fragment distal end	1)		15-18	epiphysis fusing						
ulna	L	proximal 1/2	1)		7 month foetus	estimated full length			estimated full length 40			
lunate	R	complete or alcp	26)									
lunate	L	complete or alcp	28)									
scaphoid	R	complete or alcp	36)									
scaphoid	L	complete or alcp	39)									
scaphoid	?	fragments	9)									
triquetral	R	complete or alcp	24)									
triquetral	L	complete or alcp	25)									
triquetral	?	fragment	1)									
pisiform	?	complete or alcp	16)									
sesamoids	?	complete	20)									
trapezium	R	complete or alcp	31)								1 with slight lipping around facet for 1st metacarpal	
trapezium	L	complete or alcp	25)									
trapezium	?	fragments	7)									
trapezoid	R	complete or alcp	27)									
trapezoid	L	complete or alcp	31)								1 with moderate lipping posterior part facet for 2nd metacarpal	
capitate	R	complete or alcp	24)									
capitate	L	complete or alcp	41)									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
hamate	R	complete or alcp	26	)								
hamate	L	complete or alcp	37	)								
hamate	?	fragments hook	3	)								
1st metacarpal	R	complete	1	)	15+	epiphysis fused			41.77		moderate lipping lateral palmar proximal edge head	
1st metacarpal	R	complete	1	)	15+	epiphysis fused			42.80			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			47.52			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			49.09			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			44.07			
1st metacarpal	R	base only	1	)	15+	epiphysis fused						
1st metacarpal	R	distal ends	7	)	?						3 with slight lipping palmar/proximal edge head	
1st metacarpal	L	complete	1	)	15+	epiphysis fused			38.95		proximal 1/2 bone markedly curved towards palm with slight deviation mid shaft = #? Both articular ends normal	
1st metacarpal	L	complete	1	)	15+	epiphysis fused			45.6			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			44.86			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			44.13			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			48.65			
1st metacarpal	L	complete	1	)	c. 15	epiphysis fusing			45.66			
1st metacarpal	L	proximal ends	3	)	15+	epiphysis fused						
1st metacarpal	L	distal ends	9	)	?							
1st metacarpal	?	fragments proximal end	7	)	15+	epiphysis fused						
1st metacarpal	?	complete	1	)	under 15	epiphysis unfused			28.21			
1st metacarpal	?	complete	1	)	under 15	epiphysis unfused			27.34			
1st metacarpal	?	complete	1	)	under 15	epiphysis unfused			18.35			
1st metacarpal	?	distal 1/2	1	)	under 15	epiphysis unfused			20 (est.)			
1st metacarpal	?	unfused proximal epiphysis	1	)	under 15	epiphysis unfused						
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			64.76			
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			76.45			
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			64.11			
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			66.76			
2nd metacarpal	R	alcp	2	)	15+	epiphysis fused						
2nd metacarpal	R	with bases	12	)	?							
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			75.45			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			74.5			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			74.1			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			68.09			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			69.52			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			72.61			
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			69.23			
2nd metacarpal	L	alcp	1	)	15+	epiphysis fused						
2nd metacarpal	L	with bases	16	)	?							
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			66.09			
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			71.36			
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			68.27			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			71.33			
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			74.61			
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			61.00			
3rd metacarpal	R	alcp	1	) 39	15+	epiphysis fused						
3rd metacarpal	R	with bases	24	)	?							
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			70.94			
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			66.71			
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			69.86			
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			66.22			
3rd metacarpal	L	complete	1	)	c. 15	epiphysis fusing			68.80			line of epiphyseal fusion still visible
3rd metacarpal	L	with bases	19	)	?							
4th metacarpal	R	complete	1	)	15+	epiphysis fused			51.79			
4th metacarpal	R	alcp	1	)	15+	epiphysis fused						
4th metacarpal	R	with bases	21	)	?							
4th metacarpal	R	complete	1	)	under 15	epiphysis unfused			30.09			
4th metacarpal	L	complete	1	)	15+	epiphysis fused			55.89			
4th metacarpal	L	complete	1	)	15+	epiphysis fused			53.08			
4th metacarpal	L	complete	1	)	15+	epiphysis fused			55.29			
4th metacarpal	L	complete	1	)	15+	epiphysis fused			51.55			
4th metacarpal	L	with bases	16	)	?							
4th metacarpal	L	complete	1	)	under 15	epiphysis unfused			32.84			
5th metacarpal	R	complete	1	)	15+	epiphysis fused			46.29			
5th metacarpal	R	complete	1	)	15+	epiphysis fused			52.66			
5th metacarpal	R	complete	1	)	15+	epiphysis fused			48.83			
5th metacarpal	R	complete	1	)	15+	epiphysis fused			60.49			
5th metacarpal	R	with bases	10	)	?							
5th metacarpal	R	complete	1	)	under 15	epiphysis unfused			46.69			) matching pair
5th metacarpal	L	complete	1	)	under 15	epiphysis unfused			45.96			) matching pair
5th metacarpal	L	complete	1	)	15+	epiphysis fused			57.79			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			55.03			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			52.04			
5th metacarpal	L	with bases	11	)	?							
5th metacarpal	L	complete	1	)	under 15	epiphysis unfused			45.77			
metacarpals	?	fragments	287	)	?							
metacarpals	?	fragments	3	)	c. 15	heads fusing						
metacarpals	?	fragments	2	)	under 15	epiphysis unfused						
metacarpals	?	unfused heads	2	)	under 15	epiphysis unfused						
1st proximal phalanges		complete or alcp	46	)	15+	epiphysis fused					1 with lipping around head	
1st proximal phalanges		complete	3	)	under 15	epiphysis unfused						
1st proximal phalanges		distal ends only	3									

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
proximal phalanges		complete or with bases	158	)	15+	epiphysis fused						
proximal phalanges		complete	10	)	under 15	epiphysis unfused						
proximal phalanx		complete	1	)	c. 15	epiphysis fusing						
unfused epiphyses proximal phalanges		complete	3	)	under 15	epiphysis unfused						
proximal phalanges		fragments	267	)	?							
middle phalanges		complete or with bases	237	)	15+	epiphysis fused					1 with deviation mid shaft & area of destruction =#?	
middle phalanges		complete	17	)	under 15	epiphysis unfused						
middle phalanges		fragments	40	)	?							
distal phalanges		complete or alcp	184	)	15+	epiphysis fused						
innominate	R	fragment with sciatic notch	1	)			M	narrow sciatic notch				
innominate	L	fragment with sciatic notch	4	)			F	wide sciatic notch				
innominate	?	fragment with sciatic notch	4	)			?F	sciatic notch appears wide				
innominate	?	fragment with sciatic notch	1	)			?M	sciatic notch appears narrow				
pubis	?	fragment with pubic symphysis	1	)	under 18	very billowed surface						
pubis	L	fragment with pubic symphysis	1	)	22-24	Todd's Phase III	M	short pubis				) possible pair
pubis	R	fragment with pubic symphysis	1	)	22-24	Todd's Phase III	M	short pubis				) possible pair
pubis	L	fragment with pubic symphysis	1	)	45-50	Todd's Phase IX	M	short pubis				) possible pair
pubis	R	fragment with pubic symphysis	1	) 8	45-50	Todd's Phase IX	M	short pubis				) possible pair
pubis	R	fragment with pubic symphysis	1	)	older adult	Gilbert & McKern Stage 4	F	long pubis				
pubis	R	fragment with pubic symphysis	1	)	middle-aged	Gilbert & McKern Stage 3	F	long pubis				
pubis	L	fragment with pubic symphysis	1	)	middle-aged	Gilbert & McKern Stage 3	F	long pubis				
pubis	R	fragment with pubic symphysis	1	)	20-21	Todd's Phase II	M	short pubis				
pubis	R	fragment with pubic symphysis	1	)	39-44	Todd's Phase VIII	M	short pubis				
femur	R	proximal end	1	)	16+	epiphyses fused	F	diameter head	41.23			
femur	R	proximal end	1	)	17+	epiphyses fused	M	diameter head	47.64			
femur	R	proximal end	1	)	17+	epiphyses fused	M	diameter head	47.71			
femur	R	proximal end	1	)	16+	epiphyses fused	F	diameter head	34.07			
femur	R	proximal end	1	)	16+	epiphyses fused	F	diameter head	41.51			
femur	R	proximal end	1	)	16+	epiphysis fused	F	diameter head	38.84			
femur	L	proximal end	1	)	16+	epiphyses fused	F	diameter head	41.72			
femur	L	proximal end	1	)	16+	epiphyses fused	M?	diameter head	45.05			
femur	L	proximal end	1	)	16+	epiphyses fused	M?	diameter head	45.21			
femur	L	proximal end	1	)	16+	epiphyses fused	M?	diameter head	45.47			
femur	?	detached head	1	)	16+	head fused	F	diameter head	32.84			
femur	?	detached head	1	)	16+	head fused	F?	diameter head	42.25			
femur	?	detached head	1	)	17+	head fused	M	diameter head	47.19			
femur	?	detached head	1	)	16+	head fused	M?	diameter head	44.68			
femur	?	detached head	1	)	16+	head fused	F?	diameter head	42.84			
femur	?	detached head	1	)	17+	head fused	M	diameter head	47.72			
femur	?	detached head	1	)	17+	head fused	M	diameter head	46.95			
femur	?	detached head	1	)	17+	head fused	M	diameter head	45.43			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	detached head	1	)	16+	head fused	F?	diameter head	41.79			
femur	?	detached head	1	)	17+	head fused	M	diameter head	46.07			
femur	?	detached head	1	)	16+	head fused	F	diameter head	38.74			
femur	?	detached head	1	)	16+	head fused	F	diameter head	43.15			
femur	?	detached head	1	)	16+	head fused	F	diameter head	43.24			
femur	?	detached head	1	)	16+	head fused	F	diameter head	34.70			
femur	?	detached head	1	)	16+	head fused	F	diameter head	40.98			
femur	?	detached head	1	)	17+	head fused	M	diameter head	45.70			
femur	?	detached head	1	)	16+	head fused	?	diameter head	44.15			
femur	?	detached head	1	)	17+	head fused	M	diameter head	47.00			
femur	?	detached head	1	)	16+	head fused	F?	diameter head	42.04			
femur	?	detached head	1	)	16+	head fused	F	diameter head	39.40			
femur	?	detached head	1	)	17+	head fused	M	diameter head	47.42			
femur	?	detached head	1	)	16+	head fused	?	diameter head	43.91			
femur	?	detached head	1	)	16+	head fused	?	diameter head	43.82			
femur	?	detached head	1	)	16+	head fused	F?	diameter head	42.32			
femur	?	detached head	1	)	16+	head fused	M?	diameter head	44.80			
femur	?	detached head	1	)	16+	head fused	M?	diameter head	44.56			
femur	?	detached head	1	)	16+	head fused	F	diameter head	38.71			
femur	?	detached head	1	)	16+	head fused	F	diameter head	38.98			
femur	?	detached head	1	)	16+	head fused	F	diameter head	41.32			
femur	?	detached head	1	)	17+	head fused	M	diameter head	45.81			
femur	?	detached head	1	)	16+	head fused	?	diameter head	44.44			
femur	?	detached head	1	)	16+	head fused	F	diameter head	38.98			
femur	?	detached head	1	)	16+	head fused	F	diameter head	40.67			
femur	?	detached head	1	)	16+	head fused	F	diameter head	39.62			
femur	?	detached head	1	) 59	16+	head fused	F?	diameter head	41.80			
femur	?	detached head	1	)	16+	head fused	?	diameter head	44.20			
femur	?	detached head	1	)	16+	head fused	F?	diameter head	41.58			
femur	?	unfused head	1	)	under 18	head unfused			28.83			
femur	?	unfused head	1	)	under 18	head unfused			23.40			) matching pair
femur	?	unfused head	1	)	under 18	head unfused			23.42			) matching pair
femur	?	unfused head	1	)	under 18	head unfused			31.17			
femur	?	unfused head	1	)	under 18	head unfused			34.11			
femur	?	unfused head	1	)	under 18	head unfused			32.34			
femur	?	unfused head	1	)	under 18	head unfused			32.53			
femur	?	unfused head	1	)	under 18	head unfused			35.17			
femur	?	unfused head	1	)	under 18	head unfused			32.28			
femur	?	unfused head	1	)	under 18	head unfused			22.07			
femur	?	unfused head	1	)	under 18	head unfused			33.07			

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	unfused head	1	)	under 18	head unfused			25.11			
femur	?	unfused head	1	)	under 18	head unfused			23.55			
femur	?	fragments detached head	14	)	16+	head fused						
femur	R	fragments proximal end	6	)	under 18	head unfused						
femur	L	proximal 1/2, head missing	1	)	16+	head fused						
femur	L	proximal ends	3	)	under 18	epiphysis unfused						
femur	L	proximal 1/4	1	)	under 18	head unfused						
femur	?	small fragments proximal end	15	)	under 18	head unfused						
femur		unfused epiphyses greater trochanter	11	)	under 18	epiphysis unfused						
femur	?	shaft fragments	171	)								
femur	?	fragments condyles	160	)								
femur	?	fragments unfused condyles	20	)	under 19	epiphysis unfused						
femur	L	unfused distal epiphysis	1	)	under 19	epiphysis unfused			69.16			
femur	L	unfused distal epiphysis	1	)	under 19	epiphysis unfused			40.87			
femur	?	fragment condyle	1	)	c. 17-19	epiphysis fusing						
patella	R	complete or alcp	42	) 42					max width: 39, 34, 43, 42, 40, 42, 48, 50, 46, 48, 39, 45, 47, 45, 38, 46, 45, 39, 44, 46, 47, 47, 47, 46, 47, 50, 45, 43, 45, 51, 48, 44		1 (43 mm) with bone destruction & reactive growth on superior part anterior surface, some bone destruction on superior border & between articular facets; 1 (45 mm) with lipping lateral side lateral facet; 1(51 mm) with bone destruction on superior border, lateral articular facet & between facets; 1 (48 mm) with bone destruction/reactive growth on medial facet & between facets, linear lesion across anterior surface; 1 (44 mm) small area bone destruction in each facet; 1 (not measurable) with moderate lipping around articular surface, area bone destruction on superior lateral facet & between facets, osteophytes superior anterior surface	
patella	L	complete or alcp	36	)					max width:47, 47, 47, 45, 42, 45, 43, 42, 44, 47, 52, 39, 43, 47, 41, 39, 48, 51, 49, 52, 49		1 (52 mm) with slight lipping on lateral edge just inferior to notch & marked osteophytic formation on inferior anterior surface; 1 (49 mm) with pitting & irregular growth on area between facets	
tibia	R	fragments distal end	2		16+	epiphysis fused						
tibia	R	fragment distal end	1		c. 16-18	epiphysis fusing						

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
tibia	R	unfused distal epiphysis	2		under 18	epiphysis unfused						
tibia	L	unfused distal epiphysis	3		under 18	epiphysis unfused						
tibia	?	fragments distal end	5		under 18	epiphysis unfused						
tibia	?	unfused proximal epiphysis	1		under 20	epiphysis unfused			width 56			
tibia	?	fragments unfused proximal epiphysis	2		under 20	epiphysis unfused						
tibia	?	fragments proximal end	2		16+	epiphysis fused						
fibula	?	fragments distal end	2		16+	epiphysis fused						
fibula	?	fragments shaft	2		immature	size, texture						
calcaneus	R	complete	1	)	20+	epiphysis fused			79.22			
calcaneus	R	complete	1	)	20+	epiphysis fused			75.01			
calcaneus	R	complete	1	)	20+	epiphysis fused			78.91			
calcaneus	R	complete	1	)	20+	epiphysis fused			74.03			
calcaneus	R	complete	1	)	20+	epiphysis fused			79.51			
calcaneus	R	complete	1	)	20+	epiphysis fused			77.51			
calcaneus	R	complete	1	)	20+	epiphysis fused			66.73			
calcaneus	R	complete	1	)	20+	epiphysis fused			74.57			
calcaneus	R	complete	1	)	20+	epiphysis fused			77.72			
calcaneus	R	complete	1	)	20+	epiphysis fused			73.66			
calcaneus	R	complete	1	)	20+	epiphysis fused			75.08			
calcaneus	R	complete	1	)	20+	epiphysis fused			76.20			
calcaneus	R	complete	1	)	20+	epiphysis fused			81.74			
calcaneus	R	complete	1	)	20+	epiphysis fused			65.95			
calcaneus	R	complete	1	)	20+	epiphysis fused			83.30		moderate lipping around facet for body of talus, more marked posteriorly, area of bone destruction on articular surface	
calcaneus	R	fragments	11	)								
calcaneus	L	complete	1	)	20+	epiphysis fused			80.81			
calcaneus	L	complete	1	)	20+	epiphysis fused			78.78			
calcaneus	L	complete	1	)	20+	epiphysis fused			77.59			
calcaneus	L	complete	1	)	20+	epiphysis fused			85.68		gross osteophytic growth at posterior side of sustentaculum tali - c. 15x20 mm	
calcaneus	L	complete	1	)	20+	epiphysis fused			75.97			
calcaneus	L	complete	1	)	20+	epiphysis fused			78.21			
calcaneus	L	complete	1	)	20+	epiphysis fused			69.66			
calcaneus	L	complete	1	)	20+	epiphysis fused			69.86			
calcaneus	L	complete	1	)	20+	epiphysis fused			71.53			
calcaneus	L	complete	1	)	20+	epiphysis fused			75.70			
calcaneus	L	complete	1	)	20+	epiphysis fused			74.30			
calcaneus	L	complete	1	)	under 20	epiphysis unfused			47.27			
calcaneus	L	fragments	11	)								
calcaneus	?	small fragments	107	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
talus	R	complete or alcp	34	)							1 with lipping around facet for calcaneus with area of destruction in groove above facet; area of bone destruction on inferior edge of articulation with tibia	
talus	R	complete or alcp	2	)	immature	size, texture						
talus	L	complete or alcp	40	)							1 with ring-like ridges around head and a small raised circular lesion in the centre	
talus	L	complete or alcp	3	)	immature	size, texture						
talus	?	fragments	64	)								
navicular	R	complete or alcp	28	)							1 with erosive lesion centre of facet for talus - 5.5 mm diameter; 1with erosive lesion in facet for talus - 2.5 mm; 1 with moderate lipping around facet for 2nd cuneiform	
navicular	L	complete or alcp	37	)							1 with large erosive lesion in facet for talus - 12x9 mm & moderate lipping between facets for 2nd & 3rd cuneiforms; 2 with moderate lipping between facets for 2nd & 3rd cuneiforms; 1 with moderate lipping around facet for 2nd cuneiform	
navicular	?	fragments	29	)								
1st cuneiform	R	complete or alcp	37	)								
1st cuneiform	L	complete or alcp	38	)								
1st cuneiform	?	fragments	7	)								
2nd & 3rd cuneiforms	?	complete or alcp	181	)								
cuboid	R	complete or alcp	21	)								
cuboid	L	complete or alcp	18	)								
cuboid	?	fragments	11	)								
				)								
1st metatarsal	R	complete	1	)	15+	epiphysis fused			61.96	167.49		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			63.32	169.78		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			63.25	169.66		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			50.24	147.80		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			59.57	163.48		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			60.32	164.74		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			71.44	183.42		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			60.61	165.22		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			52.55	151.68		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			55.82	157.18		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			55.96	157.41		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			59.56	163.46		
1st metatarsal	R	with bases	5	)	15+	epiphysis fused						
1st metatarsal	R	bases missing	3	)	?							
1st metatarsal	L	complete	1	)	15+	epiphysis fused			58.63	161.90		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			62.86	169.00		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			59.90	164.03		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			62.46	168.33		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			61.66	166.99		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			63.97	170.87		

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
1st metatarsal	L	complete	1	)	15+	epiphysis fused			63.77	170.53		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			67.66	177.07		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			62.58	168.53		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			68.93	179.20		
1st metatarsal	L	with bases	9	)	15+	epiphysis fused						
1st metatarsal	L	bases missing	5	)	?							
1st metatarsal	?	fragment shaft	1	)								
1st metatarsal	?	fragments with detached head	23	)								
1st metatarsal	?	small fragments proximal end	10	)	15+	epiphysis fused						
1st metatarsal	?	alcp	1	)	under 15	epiphysis unfused			30 (est.)			
2nd metatarsal	R	complete	1	)	15+	epiphysis fused			73.79	166.38		
2nd metatarsal	R	complete	1	)	15+	epiphysis fused			78.29	172.41		
2nd metatarsal	R	with bases	14	)	?							
2nd metatarsal	L	complete	1	)	15+	epiphysis fused			84.65	180.93		
2nd metatarsal	L	complete	1	)	under 15	epiphysis unfused			53.19			
2nd metatarsal	L	with bases	17	)	?							
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			73.18	171.52		
3rd metatarsal	R	complete	1	)	15+	epiphysis fused			73.03	171.32		
3rd metatarsal	R	complete	1	)	under 15	epiphysis unfused			30.07			
3rd metatarsal	R	with bases	15	)	?							
3rd metatarsal	L	complete	1	)	15+	epiphysis fused			69.76	166.87		
3rd metatarsal	L	with bases	14	)	?							
4th metatarsal	R	complete	1	) 47	15+	epiphysis fused			84.63	189.98		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			66.19	164.17		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			67.25	165.65		
4th metatarsal	R	complete	1	)	15+	epiphysis fused			62.89	159.55		
4th metatarsal	R	alcp	1	)	15+	epiphysis fused						
4th metatarsal	R	with bases	15	)	?							
4th metatarsal	L	complete	1	)	15+	epiphysis fused			70.70	170.48		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			75.78	177.59		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			72.09	172.43		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			68.82	167.85		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			63.81	160.83		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			71.84	172.08		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			67.69	166.27		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			61.89	158.15		
4th metatarsal	L	complete	1	)	15+	epiphysis fused			68.74	167.74		
4th metatarsal	L	alcp	1	)	15+	epiphysis fused						
4th metatarsal	L	with bases	20	)	?							
5th metatarsal	R	complete	1	)	15+	epiphysis fused			55.92	160.40		functional length taken
5th metatarsal	R	complete	1	)	15+	epiphysis fused			65.74	174.84		functional length taken
5th metatarsal	R	complete	1	)	15+	epiphysis fused			61.83	169.09		functional length taken
5th metatarsal	R	alcp	2	)	15+	epiphysis fused						
5th metatarsal	R	with bases	16	)								
5th metatarsal	L	complete	1	)	15+	epiphysis fused			55.27	159.45		functional length taken
5th metatarsal	L	complete	1	)	15+	epiphysis fused			55.48	159.76		functional length taken
5th metatarsal	L	with bases	22	)	?							
5th metatarsal	?	fragments proximal end	7	)								

Bone	Side	Completeness	No.	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
metatarsals		fragments	286	)								
metatarsals		complete	9	)	under 15	epiphysis unfused						
metatarsals		fragments	3	)	c. 15	head fusing						
1st proximal phalanges		complete or with bases	69	)	15+	epiphysis fused					1 with marked deviation proximal end with evidence of bone remodelling on shaft - # proximal 1/3; 1 with erosive lesion in centre of facet; 1 with gross destruction of whole of proximal articulation - facet is completely eroded with pitting & lipping.	
1st proximal phalanges		complete	10	)	under 15	epiphysis unfused						
1st proximal phalanges		complete	1	)	c. 15	epiphysis fusing						
1st proximal phalanges		fragments head	19	)								
proximal phalanges		complete or with bases	228	)	15+	epiphysis fused					1 with slight lipping around proximal articulation; 1 with moderate lipping around proximal articulation; 3 with healed mid shaft #s	
proximal phalanges		complete or with bases	3	)	c. 15	epiphysis fusing						
proximal phalanges		complete	9	)	under 15	epiphyses unfused						
proximal phalanx		unfused proximal epiphysis	1	)	under 15	epiphysis unfused						
proximal phalanges		fragments	68	)								
middle phalanges		complete	91	)	15+	epiphysis fused					1 with moderate lipping around proximal articulation; 1 with long & curved spicule of bone in the centre of the dorsal surface of the proximal articulation, projecting proximally - 8 mm long	
middle phalanges		complete	4	)	under 15	epiphyses unfused						
1st distal phalanges		complete or with bases	92	)	15+	epiphysis fused						
1st distal phalanges		complete	1	)	under 15	epiphysis unfused						
1st distal phalanges		fragments	10	)								
distal phalanges		complete	43	)	15+	epiphysis fused					1 with slight lipping around proximal articulation	
middle & distal phalanges		complete	8	)	15+	epiphysis fused					4 pairs of bones ankylosed	
general long bone		fragments	6571									
			22939									

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
frontal	R	fragment	7	)			M?	large brow ridges				
frontal	R	fragment	2	)			F?	small brow ridges				
frontal	R	fragment	2	)			?					
frontal	C/R	fragment	1	)			M?	large brow ridges				
frontal	L	fragment	4	)			M?	large brow ridges				
frontal	L	fragment	3	)			F?	small brow ridges				
frontal		fragments with central brow ridge	9	)								
frontal	L	fragments with upper orbit	11	) 11								no pathology
frontal	R	fragments with upper orbit	8	)								no pathology
frontal	?	fragments with small part orbit	2	)							2 with pitting/thickening in orbit	
occipital		fragment	4	)			M?	large nuchal area				
occipital		fragment	10	) 14			?					
temporal	L	with mastoid process	3	)			M?	large mastoid process				
temporal	L	with mastoid process	4	)			F?	small mastoid process				
temporal	L	with mastoid process	1	)			?					
temporal	R	with mastoid process	5	) 10			M?	large mastoid process				
temporal	R	with mastoid process	2	)			F?	small mastoid process				
temporal	?	fragment mastoid process	3	)			M?	large mastoid process				
temporal	?	fragment mastoid process	2	)			F?	medium mastoid process				
temporal	?	fragment mastoid process	4	)			?	mastoid incomplete				
temporal	R	with mastoid process	2	)			?					
temporal		fragments with external auditory meatus	17	)							2 with slight lipping around meatus	
temporal		fragments with zygomatic process	19	)								
temporal	L	petrous part	53	)							2 with excessive growth along ridge next to internal acoustic meatus; 2 with abnormally small internal acoustic meatus	
temporal	R	petrous part	40	) 53								
temporal	?	petrous part	3	)								
malar	L	fragments	20	)								
malar	R	fragments	16	) 20								
hyoid		unfused bodies	4									
cranium		fragments	7								fragments, mostly parietal, with excessive thickness, eg 10.42, 10.91, 12.5, 10.48 - all have thickened outer table, otherwise normal	
cranium		fragments	7								excessive thickness - but with enlarged spongy diploe, eg 11.72, 11.14, mostly parietal	
cranium		fragments	7								fragments with fine pitting mostly parietal, otherwise normal	

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
cranium		fragments	3								reactive growth, 1 parietal	
general cranial		fragments	3700									
mandibles	R	fragments	27	)								see dentition spreadsheet
mandible	R/L	alcp	1	)								see dentition spreadsheet
mandible	R/L	chin area	1	)								see dentition spreadsheet
mandibles	L	fragments	18	)								see dentition spreadsheet
mandibles	?	fragments with sockets unclear which	4	)								
mandibles	R	fragments with head	7	)								
mandibles	L	fragments with head	10	)								
mandibles	?	undiagnostic fragments	36	)								
maxillae	R	fragments	5	)								see dentition spreadsheet
maxillae	L	fragments	8	)								see dentition spreadsheet
maxillae	?	fragments with sockets unclear which	5	)								
atlas		fragments with facet for dens	24	)							1 with slight lipping around facet for dens; 2 with moderate lipping; 1 with gross lipping & destruction/reactive growth & eburnation	
atlas		fragments neural arch/facets	43	)								
axis		fragments with dens	34	) 34								
axis		alcp	2	)	?	dens unfused						
axis		alcp, dens missing	2	)								
axis		fragments neural arch	9	)								
				)								
cervical vertebra		body fragments	140	)	25+	epiphyseal ring fused					4 with slight lipping around body edges; 3 with moderate lipping; 1 with moderate lipping around superior edge body (slight lipping inferior edge) bone destruction/reactive growth superior body surface	
cervical vertebra		body fragments	2	)	c. 25	epiphyseal rings fusing						
cervical vertebra		body fragments	20	)	under 25	epiphyseal rings unfused						
cervical vertebra		body fragments	2	)	under 7	unfused bodies						
thoracic vertebra		fragments with body	54	)	25+	epiphyseal ring fused						
thoracic vertebra		fragments with body	4	)	under 25	epiphyseal ring unfused						
lumbar vertebrae		fragments with body	24	)	25+	epiphyseal ring fused					1 with slight lipping on one edge of body (the other edge missing), the body surface is smooth but undulating	
lumbar vertebrae		fragments with body	7	)	under 25	epiphyseal ring unfused						
lumbar vertebrae		fragments with body	1	)	c. 7	body fusing to neural arch						
vertebrae		small fragments body	159	)	25+	epiphyseal ring fused					2 with moderate lipping body edge	
vertebrae		part body	1	)	c. 25	epiphyseal ring fusing inferiorly, unfused superior edge						

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
vertebrae		body	1	)	c. 7	body fusing to neural arch						
vertebrae		bodies	12	)	under 7	unfused bodies						
vertebrae		fragments bodies	19	)	under 25	epiphyseal rings unfused						
vertebrae		fragments bodies	9	)	?	unclear if epiphyseal ring is fused						
vertebrae		miscellaneous fragments	1335	)								
sacrum		1st bodies	5	)	25+	epiphyseal ring fused						
sacrum		1st bodies	1	)	25+	epiphyseal ring fused	M	length body greater than width ala				
sacrum		1st bodies	8	)	under 25	epiphyseal ring unfused						
sacrum		1st bodies	1		under 7	body unfused						
sacrum		fragments 1st body	3	)	25+	epiphyseal ring fused						
sacrum		fragments lower bodies	11	)	?	fused/fusing?						
sacrum		lower bodies	2	)	immature	unfused						
sacrum		5th bodies sacrum	5	)								
sacrum		general fragments	26	)								
coccyx		bodies	9	)								
ribs		fragments shaft	3		child?	size						3 shafts R ribs in normal anatomical position, fused together pm by soil/concretion & treated by a fixer.
ribs		fragments with tubercles	199		20+	tubercle epiphysis fused						
ribs		fragments with tubercles	10		20+	tubercle epiphysis fused					slight lipping around tubercles	
ribs		fragments with tubercles	2		20+	tubercle epiphysis fused					moderate lipping around tubercles	
ribs		fragments with tubercles	23		under 20	tubercle epiphysis unfused						
ribs		fragment with tubercles	1		c. 20	epiphysis fusing						
ribs		miscellaneous rib fragments	1320								1 with callus formation on internal & external surface, no deviation = healing #	
scapula	R	glenoid + axillary border	1	)	15+	glenoid epiphysis fused	M?	robust	not measurable		wear & irregular growth on glenoid	
scapula	R	glenoid + axillary border	1	)	15+	glenoid epiphysis fused	M?	robust	not measurable			
scapula	R	glenoid cavity	1	) 5	15+	glenoid epiphysis fused	M	length glenoid	47 mm			
scapula	R	glenoid cavity	2	)	15+	glenoid epiphysis fused						
scapula	L	glenoid cavity	1	)	15+	glenoid epiphysis fused					pitting on surface glenoid	
scapula	L	glenoid cavity	2	)	15+	glenoid epiphysis fused						
clavicle	R	w. sternal end	1	)	25-28	sternal epiphysis fusing						
clavicle	R	w. sternal end	2	)	25+	sternal epiphysis fused					1 with deep area of bone destruction at site for costoclavicular ligament, surrounded by area of additional growth - ensethopathic lesion?	
clavicle	R	w. sternal end	2	)	under 25	sternal epiphysis unfused					1 with deep area of pitting and irregular growth at site for costoclaviclular ligament - ensethopathic lesion?	

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
clavicle	R	w. sternal end	1)	15	c. 25-28	fused						
clavicle	R	shafts	9)									
clavicle	L	w. sternal end	2)		25+	sternal epiphysis fused						
clavicle	L	shafts	13)									
humerus	R	distal ends	8)		14+	distal epiphyses fused						2 with septal apertures
humerus	R	distal end	1)		c.14	distal epiphyses fusing						
humerus	R	distal shafts	8)									
humerus	L	distal ends	7)	18	14+	distal epiphyses fused						2 with septal apertures
humerus	L	distal end	1)		under 14	distal epiphyses unfused						age around 13-14? - size
humerus	L	distal shafts	7)									
humerus	?	distal end	1)		under 14	distal epiphyses unfused						age around 6-7? - size
radius	L	w. distal ends	6)		16+	distal epiphysis fused						
radius	L	w. distal ends	1)		c.16	distal epiphysis recently fused						
radius	L	w. distal ends	1)		under 16	distal epiphysis unfused						age around 5 - size
radius	L	w. distal ends	1)		under 16	distal epiphysis unfused						age around 15 - size
radius	L	w. radial tuberosity	17)									
radius	R	with distal ends	9)	19	16+	distal epiphysis fused						
radius	R	with distal ends	1)		c. 16	distal epiphysis recently fused						
radius	R	with distal ends	1)		under 16	distal epiphysis unfused						age around 2 - size
radius	R	with radial tuberosity	16)								1 with circular depression & pitting on head & pitting on radial tuberosity	
radius	?	detached heads	8)		14+	heads fused						
radius	?	with radial tuberosity	5)									
ulna	L	w. proximal end	1)		14+	proximal epiphysis fused	M?	very robust bone			lipping on posterior surface of olecranon	possible match for R below
ulna	R	w. proximal end	1)		14+	proximal epiphysis fused	M?	very robust bone			sinus associated with some pitting & irregular growth on superior surface olecranon - pus sinus? = infection?	possible match for L above
ulna	L	w. proximal end	9)		14+	proximal epiphysis fused						
ulna	L	w. proximal end	1)	17	under 14	proximal epiphysis unfused						age around 5 - size
ulna	L	w. proximal end	5)		?	state epiphyseal fusion unknown						
ulna	R	w. proximal end	10)		14+	proximal epiphyses fused						
ulna	R	w. proximal end	5)		?	state epiphyseal fusion unknown						
lunate	R	complete or alcp	18)									
lunate	L	complete or alcp	18)									
scaphoid	R	complete or alcp	14)									
scaphoid	L	complete or alcp	29)									
scaphoid	?	fragments	7)									
triquetral	R	complete or alcp	18)									
triquetral	L	complete or alcp	19)									
triquetral	?	fragments	4)									
pisiform	?	complete or alcp	33)									
trapezium	R	complete or alcp	13)									
trapezium	L	complete or alcp	18)									
trapezium	?	fragments	4)									

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
trapezoid	R	complete or alcp	16	)								
trapezoid	L	complete or alcp	9	)								
trapezoid	?	complete or alcp	2	)								
capitate	R	complete or alcp	27	)								
capitate	L	complete or alcp	21	)								
hamate	R	complete or alcp	22	)								
hamate	L	complete or alcp	18	)								
hamate	?	fragments	3	)								
1st metacarpal	R	complete	1	)	15+	epiphysis fused			45.17			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			45.67			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			45.31			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			39.23			
1st metacarpal	R	complete	1	)	15+	epiphysis fused			47.31			
1st metacarpal	R	with bases	3	)	15+	epiphysis fused					1 almost complete with slight deviation of shaft, thickening of proximal 1/2 shaft and proximal articulation, shaft appears shortened, some irregular growth on shaft, lipping mediodistal side head, lipping lateral side proximal articulation (medial side damaged) = healed # with secondary arthritis	
1st metacarpal	R	fragments	10	)	?							
1st metacarpal	L	complete	1	)	15+	epiphysis fused			44.94			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			45.15			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			39.97			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			45.93			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			49.40			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			43.80			
1st metacarpal	L	complete	1	)	15+	epiphysis fused			43.41			
1st metacarpal	L	with base	1	)	15+	epiphysis fused						
1st metacarpal	L	fragments	3	)	?							
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			74.61			
2nd metacarpal	R	complete	1	)	15+	epiphysis fused			62.81			
2nd metacarpal	R	alcp	1	)	15+	epiphysis fused						
2nd metacarpal	R	with bases	18	)								
2nd metacarpal	L	complete	1	)	15+	epiphysis fused			63.27			
2nd metacarpal	L	with bases	11	)	?							
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			60.36			
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			66.43			
3rd metacarpal	R	complete	1	)	15+	epiphysis fused			67.69			
3rd metacarpal	R	with bases	17	)	?							
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			71.59			
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			67.43			
3rd metacarpal	L	complete	1	)	15+	epiphysis fused			59.64			
3rd metacarpal	L	alcp	1	)	15+	epiphysis fused						
3rd metacarpal	L	with bases	10	)								
4th metacarpal	R	alcp	3	)	15+	epiphysis fused						
4th metacarpal	R	complete	1	) 32	under 15	epiphysis unfused			51.97			
4th metacarpal	R	with bases	14	)								
4th metacarpal	L	complete	1	)	15+	epiphysis fused			64.30			

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
4th metacarpal	L	with bases	8	)	?							
5th metacarpal	R	complete	1	)	15+	epiphysis fused			55.69			
5th metacarpal	R	with bases	15	)	?						1 with osteophyte just distal to proximal end at the medial side. Cause? - no evidence of #, ligament damage?	
5th metacarpal	L	complete	1	)	15+	epiphysis fused			49.64			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			48.07			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			55.02			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			49.28			
5th metacarpal	L	complete	1	)	15+	epiphysis fused			54.46			
5th metacarpal	L	alcp	1	)	15+	epiphysis fused						
5th metacarpal	L	with bases	12	)	?							
metacarpals	?	fragments	186	)								
metacarpals		alcp	3	)	under 15	heads unfused						
unfused head metacarpal	?	complete	1	)	under 15	head unfused						
1st proximal phalanges		complete or with bases	21	)	15+	epiphyses fused						
proximal phalanges		complete	8	)	under 15	epiphyses unfused						
unfused epiphysis proximal phalanx		complete	1	)	under 15	epiphyses unfused						
proximal phalanges		fragments	249	)	?							
middle phalanges		complete or with bases	153	)	15+	epiphyses fused						
middle phalanges		complete	7	)	under 15	epiphyses unfused						
middle phalanges		fragments	17	)	?							
1st distal phalanges		complete	19	)	15+	epiphyses fused						
distal phalanges		complete	61	)	15+	epiphyses fused					2 with lipping around articular edge; 1 with angulation and bony spur on dorsal surface, distal 1/3 shaft -healed #	
ilium		fragment	1	)	under15	primary element unfused						
ilium		fragment with acetabulum	1	)	under 15	primary element unfused						
pubis		fragment with pubic symphysis	1	)	35-44	Todd's Phase VII/VIII	M	short pubis				
pubis		fragment with pubic symphysis	1	)	22-24	Todd's Phase III	M	short pubis				
pubis		fragment with pubic symphysis	1	)	22-24	Todd's Phase III	M	short pubis				
pubis		fragment with pubic symphysis	1	) 5	young adult	Gilbert & McKern Stage 0	F	long pubis				
ilium		fragment with sciatic notch	2	)			M?	notch appears narrow				
ilium		fragment with sciatic notch	1	)			F?	wide sciatic notch				
ilium		fragment with sciatic notch	1	)	immature	size	?					
ilium		fragment unfused ilium		)	child	size						
ischium		fragment unfused ischium	1	)	child	size						

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
femur	?	detached heads	29	15	16+	epiphysis fused						heads not measured
patella	R	complete or alcp	31	)		widths: 37; 40; 39; 33; 47; 48; 37; 41; 47; 42; 40; 38; 43; 42; 46; 42; 51; 46; 51; 48; 43					1 with 2 pin-sized holes + lateral articular surface, & much irregular growth anterior surface; 4 with pitting, reactive growth/ bone destruction	
patella	L	complete or alcp	33	) 33		widths: 30; 33; 45; 35; 35; 42; 45; 43; 47; 42; 40; 42; 37; 37; 36; 46; 33; 47; 46; 38; 35; 39; 39; 44; 44					4 with lipping/bone destruction/growth	
calcaneus	R	complete or alcp	7	)								
calcaneus	L	complete or alcp	9	)								
calcaneus	?	fragments	57	)								
talus	R	complete or alcp	23	)								
talus	L	complete or alcp	35	)								
talus	?	fragments	60	)							1 with bone destruction on the articular surface for calcaneus; 1 with severe wear on the inferior surface - eburnation and some bone destruction on the head & lipping on the articulation with calcaneus; 1 with area of bone destruction on articular surface with tibia & slight eburnation	
navicular	R	complete or alcp	36	)								
navicular	L	complete or alcp	28	)							1 with area of erosion in the centre of facet for talus with deep pitting	
cuboid	R	complete or alcp	7	)								
cuboid	L	complete or alcp	8	)								
cuboid	?	fragments	3	)								
1st cuneiform	R	complete or alcp	24	)								
1st cuneiform	L	complete or alcp	16	)								
1st cuneiform	?	fragments	8	)								
2nd & 3rd cuneiforms	?	complete or alcp	140	)								
1st metatarsal	R	complete	1	)	15+	epiphysis fused			65.10	172.77		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			54.13	154.34		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			60.50	165.04		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			57.01	159.18		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			66.79	175.61		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			60.70	165.38		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			53.95	154.04		
1st metatarsal	R	complete	1	)	15+	epiphysis fused			59.47	163.31		
1st metatarsal	R	with base	6	)	15+	epiphysis fused						
1st metatarsal	L	complete	1	)	15+	epiphysis fused			57.99	160.82	lipping & pitting inferior posterior edge head	
1st metatarsal	L	complete	1	)	15+	epiphysis fused			61.14	166.12		
1st metatarsal	L	complete	1	)	15+	epiphysis fused			54.37	154.74		
1st metatarsal	L	with bases	5	)	15+	epiphysis fused						
1st metatarsal	?	fragments	26	)								

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
2nd metatarsal	R	complete	1)		15+	epiphysis fused			72.99	165.31		
2nd metatarsal	R	complete	1)		15+	epiphysis fused			75.25	168.34		
2nd metatarsal	R	complete	1)		15+	epiphysis fused			74.43	167.24		
2nd metatarsal	R	complete	1)		15+	epiphysis fused			78.16	172.23		
2nd metatarsal	R	complete	1)		15+	epiphysis fused			76.84	170.47		
2nd metatarsal	R	with bases	14)		?							
2nd metatarsal	L	complete	1)		15+	epiphysis fused			79.38	173.87		
2nd metatarsal	L	complete	1)		15+	epiphysis fused			78.42	172.58		
2nd metatarsal	L	with bases	11)		?							
3rd metatarsal	R	complete	1)		15+	epiphysis fused			72.98	171.25		
3rd metatarsal	R	with bases	11)		?							
3rd metatarsal	R	complete	1)		under 15	epiphysis unfused			53.32			
3rd metatarsal	L	complete	1)		15+	epiphysis fused			67.29	163.51		
3rd metatarsal	L	with bases	8)		?							
4th metatarsal	R	complete	1)	36	15+	epiphysis fused			59.75	155.15		
4th metatarsal	R	complete	1)		15+	epiphysis fused			65.25	162.85		
4th metatarsal	R	complete	1)		15+	epiphysis fused			62.77	159.38		
4th metatarsal	R	complete	1)		15+	epiphysis fused			68.06	166.78		
4th metatarsal	R	with bases	25)		?							
4th metatarsal	L	with bases	17)		?							
5th metatarsal	R	complete	1)		15+	epiphysis fused			57.17	162.24		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			55.26	159.43		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			57.37	162.53		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			58.91	164.80		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			56.91	161.86		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			60.62	167.31		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			60.82	167.61		functional length taken
5th metatarsal	R	complete	1)		15+	epiphysis fused			64.88	173.57		functional length taken
5th metatarsal	R	with bases	13)		?						I with distortion & irregular bone formation mid diaphysis = #?	
5th metatarsal	L	complete	1)		15+	epiphysis fused			51.60	154.05		functional length taken
5th metatarsal	L	with bases	15)									
metatarsals	?	fragments	197)									
1st proximal phalanges	?	complete or alcp	45)		15+	epiphysis fused						
1st proximal phalanges	?	complete	5)		under 15	epiphysis unfused						
1st proximal phalanges	?	fragments	2)									
proximal phalanges	?	complete or with bases	186)		15+	epiphysis fused					I with marked reactive growth on base - whole proximal end is enlarged and porous - distal 1/2 is unchanged	
proximal phalanges	?	complete	2)		under 15	epiphysis unfused						
proximal phalanges	?	fragments	57)									
middle phalanges	?	complete	59)		15+	epiphysis fused						
1st distal phalanges	?	complete or with bases	51)		15+	epiphysis fused						
1st distal phalanges	?	complete	1)		under 15	epiphysis unfused						
1st distal phalanges	?	fragments	5)									
distal phalanges	?	complete	26)		under 15	epiphysis unfused						

Tomb N, Hili Gardens: Section 4 Level 6

Bone	Side	Completeness	No Fgs	Min. No.	Age	Criteria	Sex	Criteria	Measurements (mm)	Stature (cm)	Pathology	Comments
middle & distal phalanges	?	complete	6	)	15+	epiphyses fused					3 middle & distal phalanges ankylosed, no evidence of any other bony change	
general long bone	?	fragments	4704									
			15101									

Tomb N, Hili Gardens: Adult Mandibles and Maxillae

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
1	3	mandible	0	0	0	5	5	5	5	5	5	5	-	-	-	-	-	-	13+		
1	3	mandible	-	-	-	-	-	-	0	0	0	5	5	5	6	6	-	-	13+		
1	3	mandible	-	-	-	0	0	0	0	0	0	0	0	-	-	-	-	-	?		lower part mandible only
1	3	mandible	-	6	6	6	6	6	6	6	6	6	5	-	-	-	-	-	?		anterior teeth more recently lost; C(L) in situ at death?
1	3	mandible	-	5	5	5	5	5	-	-	-	-	-	-	-	-	-	-	?		
1	3	mandible	-	6	6	6	5	5	-	-	-	-	-	-	-	-	-	-	?		socket PM2 healing?
1	3	mandible		-	6	6	6	6	5	5	5	-							?	large cavity in alveolar bone at site of PM1 - abscess? - tooth probably lost am	
1	3	mandible		-	6	5	5	5	5	5	5	5	5	5	6	6			?		
1	3	mandible	-	-	-	0	5	5	5	5	5	-	-	-	-	-	-	-	?	pus sinus 6 mm, exiting inferior mandible to right of chin	abscess associated w. I2, C ?
1	3	mandible	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	17+		
1	3	mandible	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	17+		
1	3	mandible	-	-	-	-	-	-	-	-	-	-	-	6	5	6	5	-	?		
1	3	mandible	-	-	-	-	-	-	-	-	5	5	4	5	-	-	-	-	?		
1	3	maxilla	-	-	-	-	-	-	-	-	5	4	4	4	5	-	-	-	?	heavy wear C, carious lesion PM1?, whole crown missing	
1	3	maxilla	-	-	-	-	-	-	-	-	5	5	6	5	-	-	-	-	?		
1	3	maxilla	-	-	-	-	5	5	5	5	-	-	-	-	-	-	-	-	?		
1	4	maxilla	-	-	-	6	5	5	5	5	5	-	-	-	-	-	-	-	?		
1	4	maxilla	-	-	-	-	-	-	-	-	5	5	5	-	-	-	-	-	?		
2	3/4	mandible	-	5	5	6	6	5	5	5	-	-	-	-	-	-	-	-	?		
2	3/4	mandible	5	5	5	-													17+	abscess channel running from the base of M2	
2	3/4	mandible	6	6	-														17+		
2	3/4	mandible	5	6	6	0	5	5	5	5	5	5	5	-					17+	pitting & resorption at M3, resorption PM2. Resorption 17 mm	
2	3/4	mandible	6	6	6	6	6	-											17+	much resorption - 13 mm. Mental foramen partly resorbed?	
2	3/4	mandible	6	6	6	6	-												17+	much resorption but not possible to measure - damaged	
2	3/4	mandible	6	6	6	6	6	-											17+	much resorption - 12 mm	
2	3/4	mandible	6	6	6	6	6	-											17+	much resorption - not measured. Mental foramen partly resorbed?	
2	3/4	mandible	6	6	6	6	6	-											17+	much resorption	
2	3/4	mandible	-	-	-	6	6	5	5	5	5	5	-						?		chin shape rounded
2	3/4	mandible	-	-	-	-	6	6	6	6	6	6	6	6	6	-			?		chin shape rounded due to female sex?
2	3/4	mandible	-	-	-	-	5	5	5	5	5	5	5	-					?		square chin shape
2	3/4	mandible							-	5	5	5	5	0	0	0	0		?		square chin shape
2	3/4	mandible						0	0	0	0	0	5	0					?		
2	3/4	mandible												-	5	5	5	5	17+		
2	3/4	mandible												-	5	6	6	6	?old adult		obtuse angle - old adult
2	3/4	mandible												-	5	6	6	6	17+		
2	3/4	mandible							5	5	5	5	5	5	6	6	6	-	?	pitting at both premolars, resorption at PM1	square shaped chin

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
2	3/4	mandible								5	5	0	6	6	6	-			?	bone destruction at left lateral incisor, reactive growth at 3 central teeth	
2	3/4	mandible												-	6	6	6	?1	?	M3 congenitally missing? Resorption rest of body	
2	3/4	mandible										-	5	5	5	5	-		?		
2	3/4	mandible	5	-															17+	pathological change of bone around socket	
2	3/4	mandible	6	6	6	-													17+		
2	3/4	mandible	6	6	6	6	6	6	5	5	0	-							17+	abscess channel running from socket I1 to I2, absorption min ht 15 mm	
2	3/4	mandible	6	6	6	6	6	-											17+	much resorption - min ht 14.7	
2	3/4	mandible	6	6	6	5	5	5	5	4	5	-							17+	resorption greatest at M2 - ht 22 mm	
2	3/4	mandible	6	6	6	-													17+	socket for M2 healing over	
2	3/4	mandible	1?	5	5	5	5	-											?	pathological change at socket for M1, tooth still in situ?, localised loss of ht	
2	3/4	mandible	6	6	6	6	-												17+	much resorption - min ht ramus 13 mm	
2	3/4	mandible	-	5	5	5	5	5	-										?	socket of M1 thickening of bone, reduction in height M1, 2 mm	
2	3/4	mandible			-	6	6	6	5	-									?	resorption min height 15 mm	
2	3/4	mandible							-	6	6	6	6	6	6	-			?	much resorption min ht 11.7 mm	chin pointed
2	3/4	mandible						-	5	5	5	5	5	6	-				?		squarish chin
2	3/4	mandible												-	6	6	6	6	17+		
2	3/4	mandible											5	5	5	0	6	-	?	diseased bone around M1 M2	appears adult, pointed chin ?female
2	3/4	mandible												-	6	6	6	6	17+	resorption - min ht 16.6 mm	chin appears pointed -?female
2	3/4	mandible										5	5	6	6	-			?		rounded chin
2	3/4	mandible					6	6	6	6	6	6	6	6	6	6	6	6	17+	much resorption - min ht 9 mm	totally edentulous, rounded chin
2	3/4	mandible										-	5	5	5	6	6	6	17+	resorption. at M1,M2,causing slanting of PM1, PM2 & M3, only 1/2 socket for C w. path change	
2	3/4	mandible									-	5	5	5	6	6	6	6	17+		
2	3/4	mandible										-	6	6	6	6	6	6	17+	much resorption min ht 10 mm	
2	3/4	mandible															-	5	17+		
2	3/4	mandible															-	5	17+		
2	3/4	mandible												-	6	6	6	6	17+	resorption min ht 14 mm	
2	3/4	mandible													-	6	6	6	17+		
2	3/4	mandible													-	6	6	6	17+	much resorption - min ht 10 mm	
2	3/4	mandible												-	6	6	6	6	17+	resorption 16 mm	
2	3/4	mandible										-	5	0	5	5	6	6	17+	healing at M2, M3, pathological change at M1	
2	3/4	mandible										-	6	6	6	6	6	6	17+	much resorption, min ht 14 mm	
2	3/4	mandible				-	5	5	5	5	5	5	5	4	5	6	6	5	17+		round chin
2	3/4	mandible										-	5	5	6	6	6	6	17+		
2	3/4	mandible	-	6	6	5	0	5	0	5	5	0	5	6	6	6	6	6	17+	sockets PM1, PM2 very resorbed, teeth about to be shed, resorption L side min ht 16.5	chin shape rounded

Tomb N, Hili Gardens: Adult Mandibles and Maxillae

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
2	3/4	mandible	-	0	0	0	6	5	-										?		
2	3/4	mandible			-	6	5	5	-										?	large area pathological change - loss of bone around PM1	
2	3/4	mandible										-	6	6	6	6	6	6	17+	much resorption, min ht 14.5	
2	3/4	mandible															-	6	18+		
2	3/4	mandible	1	5	6	6	5	-											14-21		2 teeth lost am before M3 had erupted
2	3/4	mandible			-	6	5	5	5	-									?		
2	3/4	maxilla								-	5	6	5	5	4	6	6	-	?	much periodontal disease, socket I1 shallow & pitted, base C pitted, socket PM1 shallow, pitting at PM2, M1	possible match for above
2	3/4	maxilla								-	6	6	6	4	4	5	-		?		
2	3/4	maxilla								-	5	4	4	4	4	4	4	4	17+		
2	3/4	maxilla								-	5	5	5	5	5	-			?		dental arcade very square profile w. marked 'corner' at C
2	3/4	maxilla								-	6	6	0	6	-				?	resorption	
2	3/4	maxilla								-	5	5	5	5	-				?		
2	3/4	maxilla											-	5	5	5	5	-	?		
2	3/4	maxilla								-	5	5	5	5	5	6	5	-	?	pathological change in sockets for both premolars	
2	3/4	maxilla								-	5	5	5	4	5	6	6	-	?		
2	3/4	maxilla								-	5	5	5	6	6	-			?		
2	3/4	maxilla								-	5	5	5	5	3	6	6	-	?	pus cavities at base sockets I1 & PM2, PM1 socket closing from base & pitted w. react bone, root only of PM2, attrition	
2	3/4	maxilla									-	5	0	5	5	5	-		?	abscess within root socket of PM1, base root filled with bony growth, tooth present but soon to be expelled?	
2	3/4	maxilla														-	5	5	17+	diseased bone within socket M3	
2	3/4	maxilla										-	5	6	6	6	6	6	17+		
2	3/4	maxilla								-	5	4	5	6	-				?		
2	3/4	maxilla									-	5	4	5	5	-			?		
2	3/4	maxilla		-	5	4	5	4	-										?		
2	3/4	maxilla	-	6	6	6	5	5	6	-									?	much evidence periodontal disease, pitting at I2, PM1, PM2	possible match for below
2	3/4	maxilla	-	5	5	5	4	4	4	4	-								?		
2	3/4	maxilla				-	5	4	5	5	-								?		
2	3/4	maxilla		-	5	5	5	5	5	5	-								?		
2	3/4	maxilla					-	5	5	5	-								?		
2	3/4	maxilla		-	6	6	6	5	6	-									?		
2	4	mandible	-	5	6	5	5	5	5	-									?		
2	4	mandible	-	6	6	5	4	5	-										?		
2	4	mandible	6	6	6	-													17+		
2	4	mandible									5	5	4	5	6	6	-		?		
2	4	mandible												-	5	6	6	6	17+		M3 erupted & lost am?
2	4	mandible									5	5	5	5	5	-			?		
2	4	maxilla			-	5	5	5	5	5									?		

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
																					part of palatal 1/2 of crown
2	4	maxilla			-	5	4	5	5	5									?		undamage, very severe attrition, only rim of enamel remaining & 1/4 of crown
2	4	maxilla			-	5	6	5	5	5									?		
2	4	maxilla						-	5	5									?		
2	4	maxilla									5	5	4	5	4	6	6	-	?		
2	4	maxilla									5	5	5	4	5	-			?		
2	4	maxilla									5	6	6	5	5	6	6	-	?	bone around socket for central incisor and next 2 missing teeth appears very infected & eroded	
2	4	maxilla									5	5	5	5	5	5	-		?		
2	4	maxilla									5	5	5	6	6	6	-		?		
2	4	maxilla									5	5	5	5	5	-			?		
2	4	maxilla									5	5	5	5	-				?		
2	4	maxilla									6	6	5	0	-				?		
2	5	mandible		6	6	6	5	5	5	6	6	6	0	-					?	socket R I2 healing, socket for PM1 enlarged w. abscess socket of PM2 resorbed, pitting at R I1	
2	5	mandible		-	5	5	5	5	5	-									?	pitting around and between C & PM1	
2	5	mandible	6	6	6	6	6	6	6	6	6	6	-						17+	pitting of alveolar bone from R PM1 to L I2, much resorption, height mandible 16 mm	
2	5	mandible		-	6	4	4	4	5	5	-								?	abscess chamber at root of PM1, pitting at M1	canine has bifurcated root
2	5	mandible	6	6	6	6	6	6	5	6									17+	pitting at both incisors & canine, socket of I2 very shallow, possibly shed	
2	5	mandible	6	4	6	-													17+	abscess root of M3 10 mm diameter exiting ant surf mandible, area infection & bone destruction around - 25 x 22 mm	
2	5	mandible	6	6	6	6	5	-											17+	pitting in the base of socket of PM1	
2	5	mandible	6	6	6	5	5	5	5	5	5	5	-						17+	depression interior mandible to R mental spine, cause unclear, no other pathology	
2	5	mandible	5	5	6	6	5	5	-										17+	abscess at base of PM 1, pitting at M1	
2	5	mandible	5	6	6	5	5	5	5	-									17+	socket for PM2 enlarged, possible abscess	
2	5	mandible	6	6	6	6	0	5	5	5	5	5	5	-					17+		
2	5	mandible	6	-															17+	infection with pitting around M3	
2	5	mandible				-	5	0	0	0	0	0	-						?	C in situ ? abscess chamber at root, raised area irregular growth & pitting around foramen above mental spine	
2	5	mandible	-	6	6	6	6	6	-										?		
2	5	mandible	6	6	6	5	5	5	5	5	-								17+	possible abscess chamber at base of PM1	
2	5	mandible		-	6	6	6	4	5	5	-								?		
2	5	mandible	-	5	6	6	0	3	0	0	-								?		

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
2	5	mandible	5	0	6	5	0	5	5	-									17+	much irregular growth at M1 - normal remodelling after loss?	
2	5	mandible		-	0	4	5	5	5	5	5	-							?	abscess at L I1; ?abscess at PM1	
2	5	mandible	-	6	6	4	5	-											?	small abscess at apex root at PM1	
2	5	mandible	-		6	6	0	-											?		
2	5	mandible			-	6	6	5	-										?		
2	5	mandible			-	5	5	5	-										?		
2	5	mandible	5	5	-														17+		
2	5	mandible	6	6	6	-													17+		
2	5	mandible	6	-															17+		
2	5	mandible	4	-															17+		
2	5	mandible	6	-															17+		
2	5	mandible											-	0	4	6	6	6	17+		
2	5	mandible												-	6	6	6	6	17+	pitting alveolar surface at M1, M2	
2	5	mandible															-	5	17+	socket M3 pitted and shallow	
2	5	mandible								-	5	5	5	5	6	6	6	5	17+	small abscess I2, sinus running into C. abscess PM1, emerging ant surf, socket PM2 healing, socket M2 badly infected & misshapen, socket M3 enlarged w. abscess & sinus running into base	
2	5	mandible									-	5	5	6	6	6	6	6	17+	sockets for I2 & C resorbed, that of C distorted with abscess chamber at root	
2	5	mandible									-	0	5	5	5	6	6	6	17+	badly infected mandible, abscesses at I2?, C, PM1 & PM2. sinus & infected bone ant surf below PM2. gross infection area PM2 & M1 w. much bone destruction, infection post side, infection PM1 to M3	
2	5	mandible												-	5	6	5	6	17+	resorption infection M2, socket shallow	
2	5	mandible								-	5	5	5	5	6	6	-		?		
2	5	mandible									-	5	5	5	4	6	6	-	?	abscess at base of PM1, appears to have protruded anterior wall. PM2 broken pm but discoloured. Pitting of alveolar crest between PM1 & PM2	
2	5	mandible									-	5	6	6	6	6	6	-	?	abscess at base of I2, pitting at C, mandible greatly resorbed, height at mental foramen 12.85 mm	
2	5	mandible										-	6	6	6	6	6	-	?		mandible more resorbed posterior to mental foramen, molars probably lost prior to anterior teeth
2	5	mandible													-	6	6	6	17+	alveolar bone not fully closed at M2, irregular growth - healing or pathology?	
2	5	mandible										-	5	6	6	6	6	6	17+	mandible greatly resorbed, min height 11.51 mm	

Tomb N, Hili Gardens: Adult Mandibles and Maxillae

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
2	5	mandible									-	6	5	6	6	6	6	-	?	rounded abscess with pitting at C, pitting at !2	
2	5	mandible									-	5	5	5	5	5	5	6	17+	gross abscess at base of C & PM1 through to anterior side, probable source of infection C, large abscess chamber at M2 with pitting	
2	5	mandible												-	5	6	6	6	17+	abscess chamber at base of 5, channel running inferiorly and posteriorly into mandible. No obvious outlet although bone damaged pm	
2	5	mandible									-	5	5	6	5	6	6	6	17+	abscess chamber & channel running from base of PM2, bone resorbed but socket not obviously diseased, infection healed?	
2	5	mandible								-	5	5	4	5	6	-				heavy attrition C 3/4 crown worn away, through to pulp chamber abscess at base of root	abscess due to attrition and not caries!!
2	5	mandible													-	6	6	6	17+		
2	5	mandible													-	6	6	5	17+	small abscess pocket at base of M3, socket resorbed	single root M3
2	5	mandible															-	5	17+		
2	5	mandible													-	5	6	6	17+		
2	5	mandible													-	5	5	5	17+		
2	5	mandible												-	6	6	6	6	17+		
2	5	mandible													-	0	0	5	17+		
2	5	mandible						-	6	6	6	6	6	-					?		
2	5	mandible						-	5	5	5	5	5	-					?		
2	5	mandible					-	5	5	5	5	5	6	5	-				?	surface pitting at C - healing?	
2	5	mandible					-	5	5	5	5	5	5	-					?		
2	5	mandible						-	0	0	0	5	5	-					?		
2	5	mandible									-	5	5	4	-				?		
2	5	maxilla			-	5	4	5	5	5	4	5	4	5	6	-			?		
2	5	maxilla		-	4	5	4	5	5	5	-								?		apex of root of M1 fully closed
2	5	maxilla			-	6	6	5	5	5	-								?	pitting PM1/PM2, extends to anterior surface, ?abscess at I2	
2	5	maxilla		-	5	5	5	5	5	-									?		very square profile at C/I2
2	5	maxilla			-	6	5	5	5	5	-								?	very shallow & infected socket for C, may have already been lost am, large pus cavity I1 (7 mm long), abscesses PM1 and I2, alveolar process very resorbed	
2	5	maxilla				-	5	5	5	5	-								?		
2	5	maxilla				-	5	5	0	6									?	socket for C resorbed and abscessed	
2	5	maxilla					-	5	6	6	-								?	large abscess at base of C	
2	5	maxilla				-	5	5	5	5	-								?		
2	5	maxilla								-	5	4	5	4	4	5	-		?		
2	5	maxilla								-	5	5	5	5	5	5	-		?		
2	5	maxilla								-	5	5	5	5	-				?	small pockets infection bases central incisors	

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
2	5	maxilla								-	5	4	5	6	6	-			?		
2	5	maxilla								-	5	5	5	5	-				?		
2	5	maxilla								-	5	5	5	0	-				?	abscess pockets visible bases sockets I1 & C	
2	5	maxilla								-	5	5	5	5	5	-			?		
2	5	maxilla								-	6	5	5	6	5	5	-		?	alveolar bone resorbed, abscess base I2, channel through ant surface above tooth	
2	5	maxilla								-	5	5	5	-					?		
2	5	maxilla							-	5	5	5	4	6	-				?	large abscess cavity at base of C, channel running into nasal cavity?, abscesses left I1 & I2	
2	5	maxilla								-	5	5	-						?		
2	5	maxilla								-	5	5	5	5	-				?	alveolar bone resorbed, abscess I2 with channel through to maxilla wall	
3	4	mandible		-	5	5	5	5	5	-									?	marked loss alveolar ht around PM2 & large abscess, large area infected bone external surf, mandible body much thicker, small sinus below foramen, area infection 30 x 20. Socket M1 does not appear healthy	
3	4	mandible	0	0	0	5	5	5	5	5	5	5	5	-					?		
3	4	mandible	6	6	6	5	5	5	-										17+		
3	4	mandible	-	5	6	6	5	5	5	-									?	large abscess base M1, socket PM2 healing, infection around PM1 & abscess, socket closing?	
3	4	mandible					-	6	6	6	0	6	-						?		L lateral incisor possibly shed - socket shallow
3	4	mandible										-	4	5	6	6	6	5	17+		
3	4	mandible										-	5	5	5	6	6	-	?		
3	4	mandible						-	5	5	5	5	5	5	5	0	-		?		
3	4	mandible								-	6	6	5	5	5	-			?		sockets I1 & C almost fully healed
3	4	mandible									-	5	5	6	6	-			?		
3	4	mandible										-	5	5	5	6	-		?		
3	4	mandible				-	5	6	5	5	5	5	5	-					?		
3	4	mandible				-	6	5	5	5	5	5	5	6	-				?		
3	4	maxilla		-	5	5	5	5	5	5	-								?		
3	4	maxilla				-	5	5	5	5	-								?		
3	4	maxilla			-	5	5	6	5	5	-								?	abscess chamber base lateral incisor & PM1	
3	4	maxilla			-	5	5	5	5	5	-								?	abscess base C, PM1 erupted posterior to C into palate	
3	4	maxilla				-	5	5	5	5	-								?		
3	4	maxilla								-	5	5	5	5	-				?		
3	4	maxilla								-	5	5	5	6	-				?		
3	4	maxilla									-	5	5	5	5	5	-		?		
3	4	maxilla								-	5	5	5	6	6	-			?		
3	4	maxilla										-	5	5	5	5	-		?	socket M1 enlarged, diseased & form destroyed, abscess present	
3	4	maxilla											-	5	5	6	-		?		

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
3	4	maxilla								-	5	5	5	5	5	-			?		
3	4	maxilla								-	5	5	6	5	6	6	-		?	infection socket I2, destruction of bone with sinus in palate behind place for C	
3	4	maxilla								-	5	5	5	-					?		
3	4	maxilla								-	5	5	-						?		
3	5	mandible											-	5	4	6	6	6	17+		
3	5	mandible							-	5	5	0	0	5	6	6	6	6	17+		
3	5	mandible											-	5	5	5	6	6	17+		
3	5	mandible								-	0	0	0	0	0	6	6	6	17+		
3	5	mandible									-	5	5	6	6	-			?		
3	5	mandible									-	5	5	6	6	6	0	-	?	large cavity M2 - abscess?	socket of 1st premolar healing
3	5	mandible										-	6	6	6	-			?		
3	5	mandible													-	5	5	5	17+		fragment damaged, state dentition unclear
3	5	mandible										-	6	6	6	6	6	-	?		
3	5	mandible											-	5	5	6	6	5	17+		socket at M2 healing
3	5	mandible	-	6	6	4	5	4	5	5	5	5	5	-					?	abscess PM1	
3	5	mandible	6	6	6	5	5	5	5	5	-								17+	abscess PM2	socket at M3 healing
3	5	mandible	6	6	6	-													17+		
3	5	mandible	6	6	6	-													17+		
3	5	mandible			-	6	5	5	0	0	0	0	0						?		
3	5	mandible		-	4	5	5		-										?		
3	5	maxilla		-	5	4	4	5	5	5	-								?	socket M1 infected?, 1 line hypoplasia PM1, age c.4; 1 line hypoplasia PM2, age c.5	PMs worn flat
3	5	maxilla			-	5	5	5	-										?		
3	5	maxilla		-	5	5	5	5	5	5	-								?		
3	5	maxilla				-	5	5	5	5	-								?	abscess base root C, abscess? base root I2	
3	5	maxilla				-	5	5	5	5	-								?	abscess base root PM1	
3	5	maxilla					-	5	5	5	-								?		
3	5	maxilla							-	5	5	5	5	5	5	-			?		
3/4	5	mandible													-	5	5	4	17+		
3/4	5	mandible													-	5	2	1	?		
3/4	5	mandible											-	6	6	6	6	4	17+		
3/4	5	mandible											-	5	5	5	6	6	17+	root abscess base M1	alveolar area M2, M3 healing
3/4	5	mandible								-	5	5	5	6	6	6	-	-	?		
3/4	5	mandible						-	5	6	6	6	6	6	6	6	6	6	17+	abscess base left I2	left canine recently lost and bone healing?
3/4	5	mandible				-	5	5	5	5	5	5	5	5	5	-			?	large abscess base L C, smaller ones bases both I2s, abscess? at R PM1	
3/4	5	mandible					-	5	6	5	5	5	5	5	-				?	abscess cavities at base R I1 & L C invading external surface, possible further one at base L I2	
3/4	5	mandible						-	5	5	5	4	5	-					?		
3/4	5	mandible	5	6	6	6	6	6	-										17+		
3/4	5	mandible		-	6	5	6	5	5	5									?		
3/4	5	mandible	6	6	6	6	6	-											17+		bone x-rayed 'bone 9'

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
3/4	5	mandible		-	6	6	6	5	5	5	5	5	-						?		bone x-rayed 'bone 10'
3/4	5	maxilla									5	5	5	6	5	-			?		
3/4	5	maxilla									5	0	5	5	6	6	-		?	abscess at base C	
3/4	5	maxilla									3	6	5	6	5	6	-		?		
3/4	5	maxilla									5	5	5	4	5	-			?		
3/4	5	maxilla									5	6	6	5	6	6	-		?	pitting over external alveolar area of C	
3/4	5	maxilla							-	5	6	5	6	-					?	abscess base of C	
3/4	5	maxilla										-	5	5	5	5	-		?		
3/4	5	maxilla		-	6	5	5	-											?		
3/4	5	maxilla				-	5	5	5	5	-								?		
3/4	5	maxilla						-	5	5	-								?		
4	3	mandible	6	6	6	5	6	6	0	0									17+		
4	3	maxilla	-	6	6	5	6	5	-										?		
4	3	maxilla			-	6	6	6	6	5	-								?		PM1, C & I2 recently lost?
4	3	maxilla						-	5	5	-								?		
4	3	maxilla		-	5	6	-												?		
4	3	maxilla	5	5	5	5	-												17+	abscess base M1 & M2	
4	3	maxilla					-	5	6	5	-								?		
4	3	maxilla	-	5	4	5	5	-											?	abscess root PM1, through to palate where there is evidence of infection	
4	3	maxilla		-	0	0	5	6	6	6	-								?		
4	3	maxilla						-	5	5	5	5	5	5	4	5	-		?	abscess root I2	
4	3	maxilla								-	5	5	6	-					?	abscess root C	
4	3	maxilla									-	4	4	4	5	-			?		
4	4	mandible	5	-															17+		
4	4	mandible	6	6	6	6	6	6	6	-									17+		
4	4	mandible			-	6	5	5	5	5	-								?		
4	4	mandible	-	6	6	6	6	5	5	-									?		
4	4	mandible	-	6	6	5	5	5	5	5	5	5	-						?		
4	4	mandible	5	6	6	6	-												17+		
4	4	mandible	5	6	6	6	6	5	0	0	0	-							17+	abscess at base of I2	
4	4	mandible		-	5	6	5	5	-										?	pitting & reactive growth socket M1, unclear if tooth was in situ	
4	4	mandible	0	5	5	5	5	-											?		status M3 unclear - no socket or crypt visible
4	4	mandible	5	5	6	5	-												17+		
4	4	mandible		-	6	6	6	5	-										?		
4	4	mandible				-	5	5	5	5	-								?		
4	4	mandible		-	6	5	5	-											?		
4	4	mandible		-	5	5	5	-											?		
4	4	mandible		-	6	5	5	-											?	socket M1 appears shallow, irregular & infected	
4	4	mandible			-	6	6	6	5	-									?		
4	4	mandible	6	6	6	6	-												17+		
4	4	mandible	6	6	6	6	-												17+		
4	4	mandible	6	6	6	6	5	5	5	0	0	0	5	6	6	6	6	6	17+		in two pieces, central part damaged
4	4	mandible		-	6	5	0	0	5	5	5	5	3	-					?		canines have bifid roots
4	4	mandible					-	5	5	5	5	5	-						?		

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
4	4	mandible					-	5	5	5	5	5	5	-					?		
4	4	mandible					-	5	5	5	5	5	5	-					?		
4	4	mandible													-	6	6	-	17+	marked area infection over M2/M3, raised pitted crest on external side	
4	4	mandible	-	6	6	6	6	5	5	0									?		
4	4	mandible										-	5?	6	6	6	6	6	17+		C may already have been lost, only small part of socket left
4	4	mandible									-	5	5	5	6	6	6	6	17+		
4	4	mandible										-	5	5	6	6	6	6	17+		
4	4	mandible										-	5	5	6	-			?		
4	4	mandible	5	5	6	-													17+	sockets of M3, M2 abscessed	
4	4	mandible								-	5	5	5	5	6	-			?		
4	4	mandible										-	5	5	6	6	-		?		
4	4	mandible										-	5	5	5	6	-		?		
4	4	maxilla				-	5	5	5	-									?		
4	4	maxilla				-	5	5	6	5	-								?		
4	4	maxilla					-	5	5	5	-								?		
4	4	maxilla				-	5	5	5	5	-								?	abscess at base of C?	
4	4	maxilla		-	0	6	6	5	5	5	-								?		
4	4	maxilla				-	5	5	5	5	-								?		
4	4	maxilla					-	5	5	5	-								?	sockets incisors infected, enlarged & shallow. Teeth probably inclined inwards	
4	4	maxilla		-	0	4	4	5	5	-									?		
4	4	maxilla		-	5	5	6	6	-										?		
4	4	maxilla					0	5	6	6	-								?		
4	4	maxilla						5	6	5									?		
4	4	maxilla								-	5	5	5	5	5	-			?		
4	4	maxilla								-	5	5	5	5	6	5	-		?		
4	4	maxilla											-	5	5	5	-		?		
4	4	maxilla								-	6	5	5	6	-				?	abscess socket I2, extruding into external surf. External bone around I1 and I2 infected	
4	4	maxilla								-	5	5	6	-					?	large abscess base socket I2, extending far into bone, socket I1 shallow, tooth probably inclined inwards.	
4	5	mandible	1	5	4	5	5	5	-										14-21		root M2 complete, M3 unerupted
4	5	mandible	4	5	-														17+		
4	5	mandible	5	-															17+		
4	5	mandible	5	6	-														17+		
4	5	mandible	4	-															17+		
4	5	mandible	4	-															17+		
4	5	mandible	0	0	-														?		
4	5	mandible	6	6	6	-													17+		socket for M2 still healing
4	5	mandible	6	6	6	5	-												17+		socket for M3 still healing
4	5	mandible	0	4	6	6	6	6	-										?		
4	5	mandible	0	6	6	5	5	5	-										?		
4	5	mandible			-	5	5	5	-										?		
4	5	mandible	-	4	4	6	6	5	5	-									?		

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
4	5	mandible	-	6	6	6	6	-											?		alveolar bone at M1 & M2 healing
4	5	mandible		-	6	6	5	5	5	-									?		
4	5	mandible			-	6	6	6	5	-									?		
4	5	mandible	-	4	4	5	5	5	-										?		
4	5	mandible						-	5	6	-								?	abscess at I1	
4	5	mandible			-	6	6	4	5	-									?	abscess at C	
4	5	mandible		-	5	5	4	5	5	5	-								?		
4	5	mandible					-	5	6	6	-								?	abscess at C	
4	5	mandible			-	6	6	6	6	6	-								?		
4	5	mandible	6	4	4	5	5	-											17+		
4	5	mandible	6	6	6	4	4	5	4	4	4	5	5	5	-				17+		
4	5	mandible	6	5	6	6	-												17+		
4	5	mandible	5	0	-														17+		
4	5	mandible	6	6	6	6	5	5	5	5									17+		
4	5	mandible	5	6	6														17+	large crypt in the base of root of M3 - tooth erupting?	
4	5	mandible				5	4	5	5	0	0	0	0	-					?		
4	5	mandible				-	5	5	-										?		
4	5	mandible			-	6	5	5	5	0	0	0	4	6	6	6	6	6	17+	abscess at right C	
4	5	mandible					-	5	5	4	5	5	5	-					?		
4	5	mandible						-	6	6	6	6	6	6	-				?	socket for left C healing, mandible very resorbed	
4	5	mandible					-	5	5	5	5	5	5	5	-				?		
4	5	mandible						-	5	5	5	5	-						?		
4	5	mandible									-	5	5	5	-				?		
4	5	mandible								-	6	5	5	6	6	-			?	abscess at I1	
4	5	mandible										-	5	6	6	6	-		?	abscess at socket for C	
4	5	mandible										-	4	4	4	4	4	4	17+		
4	5	mandible										-	5	5	6	6	6	6	17+		
4	5	mandible											-	5	5	6	6	-	?		
4	5	mandible										-	5	5	5	6	6	6	17+		
4	5	mandible										-	5	5	5	5	6	6	17+		
4	5	mandible								-	5	5	5	5	5	6	6	4	17+		
4	5	mandible						-	5	5	5	4	4	5	4	4	4	5	17+		
4	5	mandible								-	5	5	5	5	5	6	4	5	17+		socket for M1 healing
4	5	mandible															-	5	17+		
4	5	mandible											-	6	6	6	6	-	?		
4	5	mandible													-	6	3	1	14-21		socket for M1 healing, very little wear on M2
4	5	mandible													-	6	6	6	17+		socket for M3 healing
4	5	mandible												-	5	6	6	6	17+		socket for M3 healing
4	5	mandible														-	6	6	17+		socket for M3 healing
4	5	mandible							-	5	5	5	5	5	5	5	-		?		
4	5	mandible											-	5	5	5	5	5	17+		
4	5	mandible										-	5	5	6	6	6	6	17+		socket for M3 healing
4	5	mandible													-	6	6	6	17+		
4	5	mandible											-	6	6	6	6	-	?		
4	5	mandible											-	6	6	6	6	-	?		
4	5	mandible														6	5	6	17+		
4	5	mandible															-	5	17+		

Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
4	5	mandible													-	6	6	6	17+		
4	5	mandible									-	5	5	5	6	6	6	6	17+		
4	5	mandible													-	6	6	6	17+		
4	5	mandible									-	5	5	5	5	5	-		?		
4	5	mandible										-	5	5	5	6	6	-	?		
4	5	mandible													-	5	5	1	14-21		
4	5	maxilla	5	6	6	4	4	5	4	5	-								17+		
4	5	maxilla	-	5	6	6	6	5	5	5									?		sockets for M1 and PM1 healing
4	5	maxilla								-	5	5	5	4	5	4	5	5	17+		
4	5	maxilla										-	5	5	6	4	6	6	17+		
4	5	maxilla							-	5	5	4	5	6	6	-			?		
4	5	maxilla								-	5	5	5	4	4	5	-		?		
4	5	maxilla								-	5	5	5	4	-				?		
4	5	maxilla	-	6	6	6	4	5	-										?		
4	5	maxilla			-	5	4	5	-										?		
4	5	maxilla				-	5	5	6	5									?		
4	5	maxilla			-	6	6	6	5	5									?		
4	5	maxilla			-	5	5	5	6	5									?		
4	5	maxilla				-	5	5	5	0									?		
4	5	maxilla	1	5	5	-													14-21		
4	5	maxilla	5	6	6	-													17+		
4	5	maxilla				-	0	5	5	0									?		
4	5	maxilla						-	5	5									?		
4	5	maxilla					-	5	5	5									?	single abscess in base of sockets for both incisors	
4	5	maxilla					-	5	5	5									?		
4	5	maxilla									5	5	5	5	6	-			?		
4	5	maxilla									5	5	-						?		
4	5	maxilla									5	5	5	5	5	-			?		
4	5	maxilla									5	5	5	5	5	6	-		?		
4	5	maxilla											-	5	5	6	-		?		
4	5	maxilla									6	6	5	6	6	-			?		
4	5	maxilla												-	5	4	5	-	?		
4	5	maxilla														-	5	1	14-21		
4	5	maxilla													-	5	4	5	17+		
4	5	maxilla									5	5	5	-					?		
4	5	maxilla									-	6	5	6	-				?		
4	5	maxilla									5	5	5	-					?		
4	6	mandible	6	6	6	6	6	5	5	5	5	5	-						17+	marked resorption over PM2 and molars, socket PM1 healing	
4	6	mandible	5	3	6	5	4	5	-										17+	caries (Grade 1) distal surface of M2	little wear on M2
4	6	mandible	-	6	6	5	5	5	5	-									?		
4	6	mandible	6	6	6	5	-												17+		
4	6	mandible	0	5	4	5	5	5	-										?	some resorption	unclear whether M3 has ever erupted
4	6	mandible	-	5	5	5	5	5	5	5	-								?		
4	6	mandible	4	6	4	4	4	5	5	-									17+		
4	6	mandible	4	-															17+		
4	6	mandible		-	5	5	4	5	5	-									?	abscess? base socket PM2	

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Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
4	6	mandible	5	-															17+		
4	6	mandible	6	6	6	6	5	-											17+		
4	6	mandible			-	6	6	5	6	6	5	5	-						?		
4	6	mandible					-	5	-										?		
4	6	mandible			-	6	6	5	0	-									?		
4	6	mandible				-	6	6	5	5	-								?		
4	6	mandible	6	6	6	6	6	6	5	5	5	5	6	6	6	6	6	6	17+	central incisors also lost am? - sockets very shallow, abscesses both lateral incisors, much resorption	
4	6	mandible									-	5	5	5	5	5	-		?		
4	6	mandible												-	5	6	6	6	17+		
4	6	mandible										-	5	5	4	6	6	0	?	abscess at the base of PM1	
4	6	mandible															-	5	17+		
4	6	mandible								-	6	6	6	6	6	6	6	-	?		socket for PM1 healing
4	6	mandible								-	5	5	5	5	5	4	4	4	17+		
4	6	mandible											-	5	6	6	6	6	17+	much bone destruction over 3 molars - very diseased	
4	6	mandible											-	6	6	6	6	6	17+	very resorbed	
4	6	mandible											-	5	5	5	6	6	17+		
4	6	mandible										-	5	5	5	5	-		?		
4	6	mandible													-	5	4	6	17+		
4	6	mandible		-	5	6	-												?		
4	6	mandible	-	6	6	-													?		
4	6	mandible			-	4	5	5	5	-									?		
4	6	mandible					-	6	5	5									?	gross infection on external surface around sockets for teeth present - the teeth may already have been lost, although the shape of the socket on the alveolar crest are just discernible - sockets almost totally destroyed on the external surface	
4	6	mandible	6	6	-														17+		
4	6	mandible	6	6	6	4	4	5	-										17+		
4	6	mandible	6	6	-														17+		
4	6	mandible	6	6	6	6	-												17+		
4	6	mandible			-	6	6	6	6	6									?		
4	6	mandible	6	6	6	6	-												17+		
4	6	mandible					-	5	5	5		5	5	5	-				?		
4	6	mandible													-	6	6	6	17+		
4	6	mandible													-	6	6	6	17+		
4	6	mandible											-	6	6	6	6	6	17+		
4	6	mandible													-	6	6	6	17+		
4	6	maxilla			-	5	5	5	5	5									?		
4	6	maxilla			-	6	6	5	6	5									?		
4	6	maxilla			-	5	5	4	4	5									?		
4	6	maxilla	-	0	4	5	-												?		
4	6	maxilla	5	5	-														17+		
4	6	maxilla	6	6	5	-													17+	gross infection at the base of both sockets - at 2nd premolar extends through to external surface	

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Section	Level	Bone	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
4	6	maxilla				-	5	5	5	5									?		
4	6	maxilla									5	5	5	-					?		
4	6	maxilla									4	0	0	5					?	gross infection on external surface at M1 & M2, large abscess at M! extending through to external surface	
4	6	maxilla									6	6	6	6	5	-			?		
4	6	maxilla									5	5	6	6	-				?		
4	6	maxilla									5	-							?		
4	6	maxilla									-	5	3	4	5	-			?	advanced wear - angled towards the palatal surface - root canal exposed	
4	6	maxilla									6	6	5	6	6	-			?		
4	6	maxilla									5	5	5	-					?		

Tomb N, Hili Gardens: Immature Mandibles Maxillae

Section	Level	Bone	e R	d R	c R	b R	a R	a L	b L	c L	d L	e L	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
1	3	mandible	0	0	0	0	0	5	5	5	4	4								1						1			c.3		
1	3	mandible	-	-	0	0	5	5	5	5	5	-								1	1	1	1						c.3		
1	3	mandible	5	5	5	-	-	-	-	-	-	-			1			1											c.7		crown unerupted C formed
1	3	mandible	5	-	-	-	-	-	-	-	-	-			1														under 6		
1	3	mandible	5	5	-	-	-	-	-	-	-	-			1														under 6		
1	3	mandible	-	-	-	-	-	-	-	-	5	3												1	1				c.4	large (Grade 3) carious lesion occlusal surface of e	
1	3	mandible	-	-	-	-	-	-	-	-	5	5												1	1	1			c.5		
2	3/4	mandible									5	5														1			c.18 mths		premolars not yet formed in crypt
2	3/4	mandible												1	5	1	1	1	1	5	5	1	1	1	1	5	1		c.7-8		age based on development of M2 still in bone
2	3/4	mandible													1														c.4		M1 not yet erupted
2	3/4	mandible												1	5	1	1	-											c.6		roots of M1 probably not complete but tooth had erupted
2	3/4	mandible											-	1	5	1	-												c.8		
2	3/4	mandible											-	1	5	-													c.7		
2	3/4	mandible								5	5	5										1				1			c.4		
2	3/4	mandible		-	5	5	5	-									-	1	1	1	-								under 6		
2	3/4	mandible		-	5	-								-	1	-													c.5		
2	3/4	mandible	5	5	5	-										1	0	1											c.6		
2	3/4	mandible		-	5	5	5	5	-						1	0	1	1	1	1	1								c.5-6		
2	3/4	mandible											-	1	-														under 6		
2	3/4	mandible																									1		?c.4-5		well unerupted molar
2	3/4	mandible																								1	1		?c.7		
2	3/4	mandible	5	5	5	5	5	-											1	1									under 5		permanent incisors still well embedded
2	3/4	mandible	-	5	5	5	5	5	5	5	5	-							1	1	1	1			1				under 5		
2	3/4	mandible						-	5	5	5	5											1	1					c.5		
2	3/4	mandible	-	5	5	5	5	-																					c.3		
2	3/4	maxilla					-		5	5	5	1									1	1							c.18 mths		deciduous M2 unerupted
2	3/4	maxilla								5	0	3										1		1		4	1		c.7	large (Grade 3) occlusal caries deciduous 2nd molar	moderate wear deciduous 2nd molar
2	3/4	maxilla								-	5	-												1					under 5		crown of permanent PM2 not complete
2	3/4	maxilla					-	5	5	5	5	-									1	1	1	1					c.5		
2	3/4	maxilla	5	5	0	5	5	-							1		1		1	1									under 5		
2	3/4	maxilla		-	5	-												1											under 6		crown of permanent C not complete
2	3/4	maxilla	3	3	5	5	5	5	5	5	3	3		1	1				1	1	1	1				1	1		c.5		some wear visible on molars

Section	Level	Bone	e R	d R	c R	b R	a R	a L	b L	c L	d L	e L	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
2	4	mandible	-	5	5	5	5	5										1	1	1	1								c. 4-5		crowns of unerupted central incisors appear to be well developed
2	4	mandible		5	5	5	5											1	1	1									c.3?		unerupted teeth appear to still be well embedded in jaw
2	4	mandible					2	2	1	1																			c. 6 months	fine pitting all over external surface of mandible	deciduous central incisors erupting?, line of fusion of halves of mandible visible
2	4	mandible								0	5	2										1	1	1	0	1			c.2		deciduous m2 erupting, roots about 1/2 formed?
2	4	mandible						5	5	2	5	2									1	?	1						c.18 months		deciduous m2 & canine erupting
2	4	maxilla	5	5	5	5	5											1	1	1									c.5		
2	4	maxilla	5	5	-										2														c. 6		
2	5	mandible											1	5	5	5	5	5	5	-									c.13		crown M3 1/2 developed, bifurcated root at C
2	5	mandible	5	5	5	-									1	1	1	1											c.5		
2	5	mandible	6	0	5	-								1	3	0	1	1											c. 7-8	carious lesion (Grade 3) at M1 on occlusal surface, and underlying enamel	deciduous m2 lost am, bone healed but some pitting
2	5	mandible	-	5	5		5	-										1	1	2									c.5		
2	5	mandible													1	-													c.2		small fragment, crypt unerupted M1 visible
2	5	mandible		-	5	5	5	-										1	1	1									c.2-3		
2	5	mandible	5	-										1	2	1	1												c.6		M1 erupting roots not fully developed
2	5	mandible	3	5	5	-									2	1	1	1											c.6		heavy attrition deciduous m2, through to dentine
2	5	mandible								-	5	5														1			c.18 mths		
2	5	mandible							-	5	5	0											1	1	1	5	1		c.6		M1 appeared to have erupted but roots not fully formed, 'e' may have been shed - cavernous socket but PM2 still well embedded
2	5	mandible					-	0	0	0	1	1																	c. 6 mths		d & e unerupted and well embedded
2	5	mandible																							-	1	1	0	c.5		
2	5	mandible					-	5	5	5	5	5									1	1	1	1	1				c.5		
2	5	mandible															-	2	5	5	5	5	2	-					c.10		
2	5	mandible		-	5	5	5	5	5	5	-							1	1	1	1	1	1						c.4		
2	5	maxilla											-	5	4	5	5	5	5	5	-								c.12?		slight rounding cusps M1, root M2 not fully developed
3	4	mandible	5	5	5	5	5	5	5	5	-				1								1						c.18 mths		

Tomb N, Hili Gardens: Immature Mandibles Maxillae

Section	Level	Bone	e R	d R	c R	b R	a R	a L	b L	c L	d L	e L	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
3	4	mandible	5	5	5	5	5	-							1	1	1	1	1	1									c.5		roots unerupted I1 & M1 started to form
3	4	mandible	2	5	2	5	5											1		1									c.18 mths		c and e erupting
3	4	mandible	-	5	5	5	0	0	0	-								1		1	1	1							c.3		
3	4	mandible	1	1	1	2	2	-																					under 6 mths		2 halves of mandible unfused - age under 6 months
3	4	mandible				-	5	5	5	0	1	1																	c.9 mths		only crown of deciduous m1 formed
3	4	mandible						-	5	5	2	1																	c.1		
3	4	mandible					-	5	5	1	1	-																	c.9 mths		only crown of d formed
3	4	maxilla		-	5	5	5	-										1	1	1									c.4		
3	4	maxilla					-	5	5	5	5	-									1		1						c.3		
3	5	mandible									5	5													1	2			c.7		
3/4	5	mandible							-	5	5	-								-	5	5	1	1	-				c.6		crown canine fully developed
3/4	5	mandible				-	1	1	1	-																			neonate		
3/4	5	mandible	5	5	5	5	5							1	2	1	1	1											c.6		
4	3	maxilla						5	5	5																			child		
4	3	maxilla						5	5																				child		
4	4	mandible												-	5	5	5	1	-										c.10		C unerupted but most of root formed
4	4	mandible											1	0	5	0	0	0	-										c.12?		
4	4	mandible											-	1	1	-													c.5		roots M1 not yet formed, crown M2 almost formed
4	4	mandible											-	1	1	-													c.5	area pitting & swelling external surface around M1/M2, no obvious infection of alveolar area	
4	4	mandible	5	-										1	1														c.4-5		
4	4	mandible		-	5	5	5	-												1									c.4		crown of I1 visible - crown only formed
4	4	mandible											1	1	4	5	5	5	5	-									c.11		roots of M2 starting to form
4	4	mandible	5	5	4	5	5	-									1												c.4-5		crown unerupted PM1 just visible, just starting to form?
4	4	mandible											1	5	5	-													c.12		roots of M3 not started to form
4	4	mandible	5	5	5	5	5	-								1	1	1	1	1									c.3-4		crown I2 almost fully formed, tip of C just visible low in mandible

Tomb N, Hili Gardens: Immature Mandibles Maxillae

Section	Level	Bone	e R	d R	c R	b R	a R	a L	b L	c L	d L	e L	M3 R	M2 R	M1 R	PM2 R	PM1 R	C R	I2 R	I1 R	I1 L	I2 L	C L	PM1 L	PM2 L	M1 L	M2 L	M3 L	Age	Pathology	Comments
																															crown I2 not quite fully formed, halves mandible
4	4	mandible			-	5	5	-										1	1	1									c. 2-3		fusing, fragment separated at join
4	4	mandible		1	1	1	1	-																					birth-6 mths		crypts for deciduous teeth visible, halves of mandible unfused
4	4	mandible																										1	c.12?		age based on position & size of crypt, roots not formed
4	4	mandible																							-	5	5	-	c.6-7		roots M1 not fully formed
4	4	mandible																							-	5	5	1	c.12		crown of M3 not fully formed
4	4	mandible						-	0	0	5	5										1	1	1	1	2			c.6		M1 erupting, crown C almost formed
4	4	mandible										0														2	1		c.6		crown unerupted M2 2/3 formed
4	4	maxilla	5	0	6	5	0								1	1	1	1	1	1	-								c.7		
4	4	maxilla						-	5	5	5	-																	c.3-5?		
4	4	maxilla												1	2	-													c.6-7		) matching halves
4	4	maxilla												1	2	-													c.6-7		) matching halves
4	5	mandible											1	2	3	1	1	-											6-13		very little wear on M1
4	5	mandible	5	5											1		1												under 3		crown of unerupted M1 partly developed - unclear of state of development
4	5	maxilla	5												1		1	1											3-5		
4	5	maxilla	-	5	5	5	5										1	1	1										3-5		
4	6	mandible																	-	5	5	5	5	1	-				c.10		
4	6	mandible															1	1	1										under 8		
4	6	mandible																				-	1	1	1	-			under 8		

Tomb N, Hili Gardens: Loose Teeth

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
1	3	8	alcp	moderate	10+	yes	4 bands	1-3	no			no	
1	3	8	alcp	slight	10+	yes	3 bands	1-3	no			no	
1	3	9	complete	unerupted	c.3	yes	1 band	c. 2.5	no			no	
1	3	10	complete	none	11+	no			no			no	very eroded
1	3	10	complete	slight/moderate	11+	no			no			no	very eroded
1	3	28	complete	unerupted	c.5	no			no			no	
1	3	28	complete	slight	12+	yes	1 band	c.5	no			no	
1	3	28	3/4 root missing	slight	12+	no			no			no	crown slightly eroded
1	3	13	complete	pinpoint dentine	12+	no			no			no	very eroded
1	3	27	distal 1/2	erupting	c.11	yes	2 bands	c.6	no			no	
1	3	4	complete	none-very slight	9+	no			?	fissure	1	yes	eroded
1	3	1	complete	unerupted	c.15	no			no			no	
1	3	1	alcp	very slight	20-25	no			?	fissure	1	no	fissure caries? tooth very eroded
1	3	17	apex root missing	slight	17-25	no			no			no	
1	3	2	complete	unerupted	c.6	no			no			no	
1	3	52	roots damaged	slight	2-8	no			yes	occlusal - palato-distal cusp	1	no	
1	4	27	crown damaged	slight polishing?	12-14	yes	2 indented lines	c.4- 5 years	no			no	
2	3/4	61	complete	unerupted	9 mths	no			no			no	
2	3/4	70	complete	unerupted	6 mths	no			no			no	
2	3/4	62	complete	unerupted	5 mths	no			no			no	
2	3/4	69	complete	unerupted	5 mths	no			no			no	
2	3/4	60	complete	unerupted	9 mths	no			no			no	
2	3/4	51	complete	unerupted	9 mths	no			no			no	
2	3/4	69	slight damage to roots	slight wear	c.4-6	no			yes	occlusal, mesolingual cusp	3	no	
2	3/4	62	complete	considerable wear	c.6	no			no			no	roots starting to resorb?
2	3/4	68	complete	none	c.2	no			no			no	
2	3/4	66	complete	slight wear	c.3-4	no			no			no	
2	3/4	7	slight damage labial surface	moderate wear	adult?	no			no			no	
2	3/4	10	alcp	slight wear	older child?	no			?	distal CEJ		no	could be caries or pm damage
2	3/4	10	fragment only	slight wear	child?	no			no			no	
2	3/4	9	fragment only	unerupted	c.4	no			no			no	
2	3/4	8	fragment	unerupted	c.5	no			no			no	
2	3/4	8	fragment	unerupted	c.5	no			no			no	
2	3/4	10	crown only, root broken off	slight wear	8+	no			no			no	
2	3/4	10	fragment	unerupted	c.5	no			no			no	
2	3/4	10	fragment	unerupted	c.4	no			no			no	
2	3/4	5	complete	unerupted	c.5	no			no			no	
2	3/4	5	complete	unerupted	c.5	no			no			no	

Tomb N, Hili Gardens: Loose Teeth

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
2	3/4	12	alcp	moderate	adult	no			no			no	
2	3/4	12	root broken	moderate	adult	no			no			no	
2	3/4	5	complete	very slight	10+	no			no			slight	juvenile or young adult
2	3/4	12	root damaged	very slight	10+	no			no			moderate	juvenile or young adult
2	3/4	premolar	root & part crown	severe	adult	no			yes	CEJ	2	no	2/3 crown worn down to pulp chamber
2	3/4	6?	complete	severe, uneven	adult	no			no			no	wear greater degree palatal side, burnt black - * same individual
2	3/4	11?	alcp	severe	adult	no			no			no	burnt black, probable match for above - * same individual
2	3/4	22	complete	severe, uneven	adult	no			no			no	burnt black, match for below - * same individual
2	3/4	27	complete	severe, uneven	adult	no			no			no	burnt black, match for above - * same individual
2	3/4	32	complete	slight	21+	no			no			no	age probably not much greater than 21
2	3/4	1	complete	slight	c.20	no			no			no	slight wear, contact point - had erupted
2	3/4	3	complete	unerupted	c.3	no			no			no	
2	3/4	7	complete	unerupted	c. 7	no			no			no	
2	3/4	18	complete	unerupted	c.8	no			no			no	
2	3/4	31	complete	unerupted	c.6	no			no			no	
2	3/4	30	slight damage to roots	unerupted	c.6	no			no			no	
2	3/4	3	complete	unerupted	c.2	no			no			no	cusp of Carbelli clearly visible
2	3/4	3	crown damaged	unerupted	c.4	no			no			no	
2	3/4	19	crown damaged	unerupted	c.3	no			no			no	
2	3/4	19	crown damaged	unerupted	c.3	no			no			no	
2	3/4	3	fragment of crown	slight	adolescent?	no			yes	distal CEJ	?		
2	3/4	6/11	fragment crown	unerupted	c.6	yes	several lines & pits	several periods 4-6 years	no			no	
2	3/4	7	complete	unerupted	c. 4-5	yes	2 lines lower 1/3 crown w. yellow band from 1st band to base tooth	2 periods c. 4 years	no			no	
2	3/4	15	alcp	unerupted	c.6	no			no			no	
2	3/4	3	buccal 1/2	unerupted	c.3	no			no			no	
2	3/4	2	alcp	slight flattening cusps, no dentine	c.17	no			no			no	mesial contact point for M1, no contact point for M3, not erupted
2	3/4	60	part crown, roots damaged	none, erupting?	c.2	no			no			no	cusp of Carbelli present

Tomb N, Hili Gardens: Loose Teeth

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
2	3/4	8/9	part crown	unerupted	c.4	yes	3 bands near CEJ	3 periods c.3 years	no			no	
2	3/4	6	distal 1/2	unerupted	c. 6-7	no			no			no	
2	3/4	8/9	fragment only	occlusal edge damaged	?	yes	2 grooves	2 periods 2-3 years	no			no	
2	4	14	mesial 1/2	unerupted	c. 5	no			no			no	cusp of Carbelli present
2	4	30	alcp crown damaged	very slight	c.10	yes	single band, 1/3 crown from CEJ	c. 2	no			no	
2	4	60	complete	moderate, islands of dentine	c.10	no			no			no	
2	4	3	complete	unerupted	c. 3	no			no			no	
2	4	2	complete	unerupted	c. 7-8	no			no			no	
2	4	2	complete	unerupted	c.6	no			no			no	
2	4	15	complete	unerupted	c. 5	no			no			no	
2	4	19	complete	unerupted	c. 3	no			no			no	
2	4	6/11	part crown damaged	unerupted	c.10	yes	1 deep band c. 6 years, less defined band c. 5 years + numerous other minor bands before and after		no				
3	4	6	complete	unerupted	c.10	yes	1 major, several minor lines - major 6 mm from CEJ	major - c. 6 years	no			no	
3	4	3	roots damaged	flattening but no dentine	17-25	no			no			no	
3	4	14	complete	unerupted	c.18 mths	no			no			no	
3	4	3	complete	unerupted	c. 2	no			no			no	)
3	4	14	complete	unerupted	c. 2	no			no			no	)
3	4	30	complete	unerupted	c. 2	no			no			no	) same individual
3	4	19	complete	unerupted	c. 2	no			no			no	)
3	4	7	complete	very slight attrition	c.10?	no			no			no	
3	4	24	complete	moderate, line dentine showing		no			no			no	
3	4	12	roots slightly damaged	slight rounding of cusps		no			no			no	single root
3	4	4	complete	slight polishing of cusps		no			no			no	
3	4	21	most of root missing	rounded		no			no			no	
3	4	21	complete	cusps flattened		no			no			no	
3	4	1	one root damaged	polished	c.18	no			no			no	
3	5	18/31	complete	polishing on cusps	c.12	no			no			no	tooth just erupted

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
3	5	4	complete	unerupted	c.9	no			no			no	
3	5	17/32	complete	unerupted	c.15	no			no			no	only 3 cusps but morphologically similar to other M2
3	5	2	alcp	unerupted	c.7	no			no			no	
3	5	17/32	roots damaged	unerupted	under 21	no			no			no	
3	5	30	complete	unerupted	c. 2	no			no			no	
3	5	2	almost complete	unerupted	c.6	no			no			no	
3	5	5/12	part crown damaged	just erupted	c.10	no			no			no	
3	5	10	complete	erupting	c.8	yes	2 lines close to CEJ	2 periods c. 4 years	no			no	
3	5	9	crown damaged	slight polishing occlusal surface	c. 10	yes	3 lines - 6, 4 & 2 mm from CEJ	3 periods, 2 to 3 years	no			no	
3	5	51/60	alcp	unerupted	c. 1 year				no				
3/4	5	2	complete	unerupted	c.6	no			no			no	
3/4	5	2	complete	unerupted	c.6	no			no			no	
3/4	5	2	alcp	unerupted	c.3	no			no			no	
3/4	5	30	one root damaged	cusps, recently erupted	c.7	no			no			no	
3/4	5	14	longitudinal 1/2 only	cusps, recently erupted	c.7	no			no			no	
3/4	5	14	longitudinal 1/2 only	unerupted	c.3	no			no			no	
3/4	5	6	longitudinal 1/2 only	erupting	c.11	yes	2 linear bands near CEJ	2 periods c. 6 years	no			no	
3/4	5	70	enamel and roots slightly damaged	moderate wear, pinpoint dentine showing	c.7	?			no				
3/4	5	14	enamel damaged, roots missing	tooth flattened, pinpoints dentine	17-25	?			yes	occlusal	3	?	
3/4	5	1	complete	cusps, recently erupted	c.21	no			no			no	
3/4	5	8	root missing	cusps	c.21	no			no			no	
4	3	14	crown roots slight damage	unerupted	c.6	yes	2 indented lines	c.2 & 3 years	no			no	
4	3	30	complete	unerupted	c.2	no			no			no	
4	3	10	distal 1/2 only	erupting	c.8	?			no			no	enamel surface eroded
4	3	59	mesial 1/2 only	slight	3-7	no			?	occlusal?	1	no	?caries situated at line of break
4	3	6	complete	moderate/advanced (Smith 6?)	adult	yes?	2 indented lines	c.4 & 6 years	no			no	enamel slightly damaged
4	3	16	slight damage roots & enamel	but no dentine exposure	21+	no			no			?	slight pm concretion adhering
4	3	1	slight damage to roots	very slight rounded cusps	21+	yes	2 indented lines	c.11 & 12	yes	contact	1	no	
4	3	21	slight damage to roots	but no dentine exposure	13+	no			no			no	
4	3	9	complete in 2 pieces	very slight - recently erupted	c.10	yes	2 (3?) indented lines	c.3, 3½(?), 4	no			no	1 line hypoplasia very slight; match for below

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	3	8	buccal surface crown damaged	very slight - recently erupted	c.10	yes	2 (3?) indented lines	c.3, 3½(?), 4	no			no	1 line hypoplasia very slight; match for above
4	3	19?	crown and roots damaged	slight - flattened wear, no dentine	10-17?	?			yes	buccal CEJ	2	no	
4	3	8	enamel damaged	fine line dentine exposure	10+	yes	2 deep pits followed by ridges	2 periods c.4	no			no	
4	3	6	complete	- 5 mm buccal 2 mm lingual enamel left	adult	yes	2 deep lines with ridges + 1 band pits	3 periods c. 6-7 years	no			no	possible more hypoplastic bands lost by attrition
4	3	14	roots damaged	cusps polished - no dentine	9-17	no			no			no	
4	3	15	complete	surface flattened - 1 pinpoint dentine exposure	17-25	no			no			no	enamel surface eroded
4	3	20	complete	surface flattened - no dentine exposure	13+	no			yes	occlusal - probably from fissure	2 - deep into crown	no	
4	3	27	crown damaged	?	12+	yes	wide band	c.5	no			no	enamel eroded
4	3	21	root damaged	rounded		no			no			no	enamel eroded
4	3	16	roots damaged	light - cusps polished, recently erupted	17+	no			no			no	
4	3	19	complete	unerupted	c.2	no			no			no	
4	3	31	complete	unerupted	c.5	no			no			no	
4	3	2	complete	unerupted	c.6	no			no			no	
4	3	6	crown damaged	unerupted	c.10	yes	middle deepest	3 periods c. 5	no			no	
4	3	57	root damaged	slight polishing - recently erupted	c. 1	no			no			no	
4	3	54	complete	unerupted	months	no			no			no	
4	3	53	complete	unerupted	c.1 year	no			no			no	
4	3	16	complete	unerupted	c.12	no			no			no	
4	3	9	root damaged	unerupted	c.3-6	no			no			no	enamel very eroded
4	3	5	base crown damaged	unerupted	under 10	no			no			no	unclear whether roots had started to form
4	3	5	complete	cusps	12+	no			no			no	enamel slightly eroded
4	3	6	complete	crown 1/2 worn away	adult	no			no			no	enamel slightly eroded
4	3	22	complete	crown 2/3 worn away	adult	no			no			no	
4	3	22	complete	crown 2/3 worn away	adult	no			no			no	
4	3	22	crown & apex damaged	crown 1/2 worn away	adult	no			no			no	attrition uneven - greater towards buccal side
4	3	13	complete	crown flattened, no dentine	12+	no			no			no	
4	3	21	complete	slight dentine exposure	12+	no			no			no	enamel eroded

Tomb N, Hili Gardens: Loose Teeth

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	3	14	slight damage to roots	crown - no dentine exposure	under 17	no			no			no	
4	3	1	complete	cusps - no dentine exposure	17-25	no			no			no	
4	3	19	root damaged	? flattening of cusps	?under 17	no			yes	occlusal	3. marked - most internal crown	no	
4	3	16	crown damaged	no dentine exposure	18+	no			no			no	much pm concretion
4	4	2	complete	slight rounding of cusps	c.16	yes	single ridge running round crown 2 mm from CEJ	c. 7	no			no	no contact points visible, roots coalesced (occurs 30% cases)
4	4	19	complete	unerupted	c.4	no			no			no	
4	4	15	complete	unerupted	c.9	no			no			no	
4	4	2	complete	very slight wear, so tooth must have started to erupt	17-21	no			no			no	
4	4	28	complete	rounding of cusps but no dentine	young adult/ adolescent	no			no			no	
4	4	19	complete	unerupted	c. 3	no			no			no	
4	4	2	complete	unerupted	c. 9	no			no			no	
4	4	15	complete	unerupted	c.8	no			no			no	
4	4	2	complete	unerupted	c.7	no			no			no	
4	4	15	roots damaged	very slight polishing on cusps	adolescent	yes	band, finishing just at the point where the roots start to bifurcate	c.10	no			no	
4	4	32/17	complete	unerupted	c. 12	no			no			no	
4	4	32/17	complete	unerupted	c.16	no			no			no	
4	4	51	mesiobuccal root missing	only slight wear on cusps	c. 3	no			yes	mesial crown	2	no	) probable match with below
4	4	60	complete	only slight wear on cusps	c. 3	no			no			no	) probable match with above
4	4	51	part palatal crown and root damaged	flattening of cusps	? 8-10	no			no			no	
4	4	70	complete	slight polishing of cusps	c. 3	no			yes	mesial crown	2	no	
4	4	6/11	crown damaged	very slight polishing on cusps	c. 11	yes	2 bands c. 5 & 6		no			no	

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	4	10	crown damaged	unerupted	c. 4	no			no			no	
4	4	68	buccal part of crown and root missing	slight polishing on cusps, recently erupted	c. 2	no			no			no	
4	4	27	complete	unerupted	c. 5	no			no			no	
4	4	canine	part labial surface	ring of enamel remaining	adult	yes	one strong line 4 mm from CEJ	c. 6					
4	5	31/18	complete	unerupted	7-8	no			no			no	
4	5	30/19?	complete	unerupted	c.2?	no			no			no	appears to be a 1st rather than 2nd molar
4	5	30/19?	complete	unerupted	c.2?	no			no			no	appears to be a 1st rather than 2nd molar
4	5	31/18	complete	unerupted	c.5	no			no			no	
4	5	19	complete	unerupted	c.3	no			no			no	
4	5	19	complete	unerupted	c.3	no			no			no	unusual enamel formation occlusal surface, 'folds' of enamel surround peaks of cusps, more marked lingual cusps
4	5	31	slight damage	very slight wear on tips of cusps - just erupted	c.12	no			no			no	match for below
4	5	18	slight damage	very slight wear on tips of cusps - just erupted	c.12	no			no			no	match for above
4	5	30	crown damaged	unerupted	c.3	no			no			no	
4	5	30/19	fragment only	unerupted	c.4	no			no			no	
4	5	30	distal 1/2 tooth only	no sign of wear - unerupted?	c.6-7	no			no			no	
4	5	30	distal 1/2 tooth only	unerupted	c.4	no			no			no	
4	5	30	crown slightly damaged, root broken off	slight	13+	no			no			no	mesial contact point visible - M2 had erupted; buccal cusps worn flat no dentine - lingual cusps slightly worn
4	5	31/18	fragment only	unerupted	c.7	no			no			no	
4	5	19	fragment only, split lengthways	no evidence of wear, just erupted or erupting	c.7	no			no			no	
4	5	31	complete	unerupted	c.7	no			no			no	match for below
4	5	18	complete	unerupted	c.7	no			no			no	match for above
4	5	3	complete	unerupted	2½-3	no			no			no	cusp Carbelli present; 2 small additional cusps between mesiopalatal & distopalatal; several perikymata lower part crown
4	5	3/14	palatal 1/2 only	very slight wear on cusps	c.7	no			no			no	

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	5	3	palatal 1/2 only	rounded wear on cusps	c.9	no			no			no	
4	5	3	palatal 1/2 only; roots damaged	very slight wear on cusps	child?	no			no			no	cusp of Carbelli present
4	5	1?	complete	unerupted	c.12	no			no			no	possible 3-cusp form 2nd molar - if so, age would be c. 7
4	5	16?	complete	unerupted	c.12	no			no			no	possible 3-cusp form 2nd molar - if so, age would be c. 7
4	5	2	palatal 1/2 only	cusps worn flat, no dentine	adult	no			no			no	distal contact point so M3 had erupted
4	5	15	palatal 1/2 only	rounded wear on cusps	adult	no			no			no	
4	5	30	buccal 1/2 only	roots just starting to form	c.5	yes	single band	c.2 years	no			no	
4	5	3/14	buccal 1/2 only, crown damaged	cusps rounded	subad/adult	no			no			no	
4	5	3	lingual 1/2 only	none - unerupted	c.5	no			no			no	
4	5	31/18	mesiodistal split	none - unerupted	c.9	no			no			no	
4	5	15	palatal 1/2 only	slight wear on mesiopalatal cusp	c.12	no			no			no	very white enamel - probable match for below
4	5	3	crown only	very slight	c.12	no			no			no	very white enamel - probable match for below. Very rhomboid outline - MD 9.67; BL 11.77
4	5	2/15	palatal1/2	very slight wear on cusps	c.14	?			no			no	2 fine lines round base of crown + 1 round root. Perikymata or hypoplasia?
4	5	19	crown only, root broken off	slight wear on tips of cusps	c.8	no			no			no	
4	5	31/18	mesial 1/2 crown, roots broken off	very slight wear on cusps	c.14	no			yes	occlusal, probable fissure but tooth incomplete	4 - massive - in dentine under enamel	no	
4	5	14	buccal roots damaged but otherwise complete	occlusal surface polished but enamel intact	under 17	no			?	small hole mesiobuccal cusp, possible caries	1	no	
4	5	31/18	roots broken off	occlusal enamel worn flat but dentine intact	17-25	no			yes	occlusal - fissure between mesial cusps	2	no	contact point for third molar
4	5	30	mesial 1/2 only	very slight wear mesiobuccal cusp	c.8	no			no			no	

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Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	5	17/32	mesial or distal 1/2 only	slight wear on occlusal surface	c.20	no			no			no	
4	5	1/16	crown only	slight wear on cusps	17-25	no			no			no	
4	5	13	palatal 1/2 only	just erupted	c.12	no			no			no	
4	5	5	complete	unerupted	c.4	no			no			no	
4	5	28	complete	unerupted	c.7	no			no			no	
4	5	21/20	complete	unerupted	c.4	no			no			no	
4	5	28/29	complete	unerupted	c.3.5	no			no			no	
4	5	29/20	complete	unerupted	c.3.5	no			no			no	match for below
4	5	28/21	complete	unerupted	c.3.5	no			no			no	match for above
4	5	21	complete	rounded - had probably just erupted	c.10	?			no			no	at least 10 rings perikymata round root. very large tooth
4	5	21	complete	occlusal surface worn flat but dentine intact	older adult	no			no			no	
4	5	28	complete	occlusal surface worn flat	older adult	?yes	single line 1.5 mm from CEJ	c.6 years	no			no	possibly perikymata
4	5	4	complete	occlusal surface worn through to dentine	older adult	no			no			no	
4	5	6/11	complete	unerupted	c.5-6	no			no			no	
4	5	2/27	complete	unerupted	c.7	no			no			no	
4	5	27	complete	tip of cusp worn down, dentine just showing through	older adult	yes	4 lines around lower ½ crown	c.3-6 years	no			no	hypoplasia rather than perikymata
4	5	22	crown damaged	unclear	14+	no			yes	mesial CEJ	2	no	
4	5	22	upper part crown damaged	unclear	c.11	no			no			no	
4	5	21/28	upper part crown broken off	unclear	13+	no			no			no	
4	5	6/11	part of crown missing	unclear	15+	no			no			no	
4	5	22/27	most of crown missing	unclear but probably just erupting	c. 9-10	?			no			no	presence of hypoplasia or caries unclear - crown damaged
4	5	6/11	part crown and root	unerupted	c.7-8	no			no			no	
4	5	27	mesial side only	unerupted	c.8	no			no			no	
4	5	6/11?	crown damaged	very little	13+	yes	three lines	3, 6 & 7 years	no			no	linear developmental anomaly on crown just below mesial or distal CEJ to palatal surface (or further) possible associated with deviation of root
4	5	7	crown damaged	unclear	c.11	no			no			no	
4	5	canine/premolar	complete	worn through to root & pulp chamber	old adult	?			?			?	

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	5	70	complete	slight wear on tips of cusps	c.3	no			no			no	probable match for below
4	5	69	complete	tips of buccal cusps worn flat	c.3	no			yes	distal CEJ	2	no	probable match for above
4	5	69	slight damage crown & root	slight wear visible on cusps	c.3	no			yes?	distal CEJ	1	no	possible carious lesion but small
4	5	51	distal 1/2 only	cusps	c.3	no			no			no	
4	5	51	distal 1/2 only	very slight wear on tips of cusps	c.2 ½	no			no			no	
4	6	3	roots damaged	very slight wear distopalatal cusp	13+	no			no			no	contact point for M2
4	6	14	roots missing	slight attrition	17-25	no			no			no	massive tooth - probably a match for below
4	6	3	crown and part root	slight attrition	17-25	no			no			no	massive tooth - probably a match for above
4	6	15	complete	very slight attrition on points of cusps	c.14	no			no			no	no contact point for M3 - probable match for below
4	6	2	complete	very slight attrition on points of cusps	c.14	no			no			no	no contact point for M3 - probable match for above
4	6	30	complete	point on tip of buccodistal cusp	c.6	no			no			no	
4	6	30	complete	unerupted	c.2	no			no			no	
4	6	18	both crown and root damaged	?	?	no			yes	occlusal?	3 - most buccolingual crown	no	
4	6	31/18	complete	unerupted	c.7	no			no			no	
4	6	31/18	complete	unerupted	c.7	no			no			no	
4	6	3	buccal roots damaged	no dentine showing	adolescent?	no			no			slight	possible match for below
4	6	14	crown and roots damaged	no dentine showing	adolescent?	no			no			slight	possible match for above
4	6	31/18	complete	unerupted	c.7	no			no			no	
4	6	31/18	complete	unerupted	c.7	no			no			no	
4	6	31/18	complete	unerupted	c.7	no			no			no	
4	6	31/18	both roots damaged	cusps	nt?	no			no			no	
4	6	31/18	both roots damaged	slight wear on cusps	adolescent?	no			no			no	3 mm band yellowish discoloration round enamel; no contact point for M3
4	6	31/18	both roots damaged	cusps	nt?	no			no			no	no contact point for M3
4	6	32	roots damaged	cusps	25-35	no			no			no	
4	6	16	complete	very slight wear on the tip of cusps	c.18	no			no			no	
4	6	16	roots damaged	moderate wear on occlusal surface	21-25?	no			no			no	
4	6	1	roots damaged	moderate wear on occlusal surface	21-25?	no			no			no	
4	6	14	fragment	unerupted	c.5	no			no			no	

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Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	6	3	fragment	unerupted	c.5	no			no			no	
4	6	30	complete	unerupted	c.2	no			no			no	
4	6	17/32	crown damaged, roots broken off	pinpoints of dentine	21-25	no			no			no	
4	6	30	fragment	unerupted	c.4	no			no			no	buccal pit (foramen caecum molarum); probable match for below
4	6	19	fragment	unerupted	c.4	no			no			no	probable match for above
4	6	19/30	damaged	slight wear on cusps	c.8	no			no			no	probable match for below
4	6	19/30	damaged	slight wear on cusps	c.8	no			no			no	probable match for above
4	6	4	complete	slight wear	c.10	no			no			no	
4	6	20	complete	very little wear on crown	c.13	no			?	small deep pit distal fossa, possible caries	1	no	
4	6	28	complete	slight wear	c.15	?	double perikymata base of crown		no			no	
4	6	29	complete	moderate wear, tooth worn flat, enamel just worn through on buccal cusp	adult?	no			no			no	
4	6	28	complete	heavy wear, tooth worn flat, enamel worn through on buccal cusp	adult	?	single perikymata base crown		no			no	
4	6	29/20	complete	cusps worn flat through to dentine	adult	?	single perikymata base crown		no			no	
4	6	20	complete	unerupted	c.8	no			no			no	
4	6	2	complete	very little wear on cusps	c.16?	no			no			no	
4	6	2/15	complete	marked, crown worn flat, through to dentine	adult	no			no			no	
4	6	2/15	crown damaged	moderate wear	adult	no			no			no	
4	6	4/13	complete	unerupted	c.5	no			no			no	
4	6	5	complete	unerupted	c.5	no			no			no	a match for below
4	6	12	complete	unerupted	c.5	no			no			no	a match for above
4	6	5/12	slightly damaged	unerupted	c.5	no			no			no	
4	6	5/12	slightly damaged	unerupted	c.5	no			no			no	

Section	Level	Tooth	State of Completion	Degree of Attrition	Age at Death	Hypoplasia Present	Form Hypoplastic Lesion	Age Hypoplasia Occurred	Caries	Caries Position	Grade of Caries	Calculus Present	Comments
4	6	4/13	crown damaged	moderate wear	adult	no			no			no	
4	6	4/13	complete	extreme wear, crown completely worn down to the root	adult	no			no			no	
4	6	6/11	crown damaged	extreme wear	adult	no			no			no	massive root
4	6	6	complete	unerupted	age c.5	no			no			no	numerous perikymata
4	6	11	complete	unerupted	age c.6	no			no			no	no perikymata
4	6	9	slight damage to crown	extreme	adult	no			no			no	palatal enamel completely worn away, small rim enamel incisal edge & CEJ, occlusal edge horizontal wear
4	6	7	complete	unerupted	c.5-6	no			no			no	numerous perikymata; match for below
4	6	10	complete	unerupted	c.5-6	no			no			no	numerous perikymata; match for above; lower edge palatal surface enamel formed into 'pleat'
4	6	7	palatal 1/2 only, slight damage to root	very little wear on incisal edge	older child?	no			no			no	fairly deep foramen caeum incisivum
4	6	7	palatal 1/2, crown damaged	? - incisal edge missing	11+	no			no			no	fairly deep foramen caeum incisivum
4	6	7	inferior 1/2 root missing	moderate - line of dentine showing	11+	no			no			no	
4	6	23/26	complete	unerupted	c.3	no			no			no	
4	6	53	slight damage to root	slight wear occlusal surface	c. 2-3	no			no			no	
4	6	52/59	slight damage to root	slight wear on cusps	c.2½	no			no			no	

Tomb N, Hili Gardens: Weight of Human Remains (Kg.)

Skeletal Area	S1 L3	%	S1 L4	%	S2 L3/4	%	S2 L4	%	S2 L5	%	S3 L4	%	S3 L5	%	S3/4 L5	%	S4 L3	%	S4 L4	%	S4 L5	%	S4 L6	%	Total	%
Skull	1.85	*18*	0.35	*12*	14.26	*22*	2.09	*23*	9.65	*15*	5.55	*20*	5.12	*24*	3.60	*21*	1.90	*18*	9.75	*17*	12.08	*16*	7.58	*15*	73.76	*18*
Spine	0.40	*4*	0.10	*4*	2.71	*4*	0.70	*8*	3.13	*5*	1.95	*7*	1.05	*5*	0.60	*3*	0.25	*2*	3.45	*6*	4.63	*6*	2.18	*4*	21.14	*5*
Thorax	0.30	*3*	0.10	*4*	2.09	*3*	0.45	*5*	1.55	*2*	0.60	*2*	0.43	*2*	0.55	*3*	0.20	*2*	1.50	*3*	2.73	*4*	1.48	*3*	11.97	*3*
Pelvis	0.10	*1*	0.03	*1*	2.75	*4*	0.21	*2*	2.47	*4*	0.70	*2*	0.43	*2*	0.45	*3*	0.25	*2*	1.85	*3*	0.83	*1*	1.25	*3*	11.31	*3*
Limbs	2.90	*29*	0.55	*19*	26.18	*41*	1.46	*16*	30.45	*46*	10.31	*37*	5.81	*27*	5.10	*29*	3.00	*29*	21.22	*36*	28.13	*37*	16.73	*34*	151.84	*37*
Hands	0.20	*2*	0.10	*4*	0.93	*1*	0.20	*2*	1.40	*2*	0.48	*2*	0.45	*2*	0.50	*3*	0.20	*2*	1.30	*2*	1.80	*2*	1.45	*3*	9.01	*2*
Feet	0.20	*2*	0.05	*2*	2.71	*4*	0.21	*2*	3.73	*6*	1.40	*5*	1.10	*5*	1.20	*7*	0.45	*4*	3.00	*5*	4.28	*6*	3.03	*6*	21.35	*5*
Unidentified	4.10	*41*	1.55	*55*	12.15	*19*	3.65	*41*	13.77	*21*	7.05	*25*	7.05	*33*	5.50	*31*	4.20	*40*	16.32	*28*	21.26	*28*	16.25	*33*	112.85	*27*
Total	10.05	*2*	2.83	*1*	63.77	*15*	8.97	*2*	66.15	*16*	28.04	*7*	21.43	*5*	17.50	*4*	10.45	*3*	58.39	*14*	75.71	*18*	49.94	*12*	413.21	*100*

Tomb N, Hili Gardens: Minimum Number of Individuals

Skeletal Area	S1 L3	S1 L4	S2 L3/4	S2 L4	S2 L5	S3 L4	S3 L5	S3/4 L5	S4 L3	S4 L4	S4 L5	S4 L6	Total
Frontal	8	1	35	5	17	8	8	6	7	28	29	11	163
Petrous part	13	2	69	12	53	22	30	18	12	51	72	53	407
Maxilla	2	2	20	10	13	10	6	7	8	14	17	7	116
Mandible	14	2	35	12	33	17	11	9	1	38	33	20	225
Clavicle	7	3	39	6	38	6	4	12	4	29	15	15	178
Scapula	8	1	34	6	30	12	12	11	4	32	3	5	158
Spine	4	3	32	11	27	23	14	11	5	46	52	36	264
Humerus	3	2	16	10	20	11	13	17	7	17	20	18	154
Radius	8	2	29	6	22	6	19	15	4	23	23	19	176
Ulna	7	2	45	9	31	15	14	11	3	30	43	17	227
Hand	8	5	19	5	23	12	13	14	11	34	39	32	215
Pelvis	2	2	13	6	20	11	5	8	4	17	8	5	101
Femur	3	2	21	6	33	16	16	11	4	43	59	15	229
Patella	4	1	29	5	46	18	12	16	6	36	42	33	248
Fibula	3	4	18	5	22	23	8	9	4	17	4	0	117
Feet	5	3	29	8	33	18	15	17	9	32	47	36	252
Min. No. based on highest bone count	14	5	69	12	53	23	30	18	12	51	72	53	412

Tomb N, Hili Gardens: Evidence for Age at Death Children

Section/ Level	Bone/Tooth	Foetus/ Neonate	Infant	Child	Adolescent	Total Children
S1 L3	mandible/left clavicle		c.2- 3			
	mandible/left clavicle		c. 2-3			
	mandible			c.7		
	mandible		under 6			
	mandible		under 6			
	mandible/left ulna		c. 4			12
	mandible/shaft radius			c. 5		
	lower left canine/right femur				c. 11	
	upper right M3				c. 15	
	right ulna	neonate				
	right ulna	foetus				
	right ulna	foetus				
S1 L4	lower left canine				c. 12-14	
	vertebrae		under 3			
	right clavicle		c. 4			5
	ischium	neonate to 6 months				
	left tibia		c. 1 year			
S2 L3/4	mandible/maxilla/vertebra		c. 18 months			
	mandible/right clavicle			c. 7-8		
	mandible					
	mandible+loose teeth		c. 4			
	mandible+loose teeth			c. 6		
	mandible/vertebrae			c. 8		
	teeth/vertebrae/right ischium			c. 7		
	mandible/maxilla		under 6			
	humerus/right radius/fibula			c. 5		
	mandible/maxilla+loose teeth			c. 5		
	mandible/right ischium			c. 5-6		
	mandible/maxilla		under 5			
	mandible/maxilla		under 5			
	mandible+loose teeth/vertebrae		c. 3			
	loose teeth/left ischium		c. 3			28
	ischium		c. 2			
	3 loose teeth/fibula		9 months			
	humerus		5 months			
	right clavicle/radius/left ulna	foetus/neonate				
	radius/left ulna/phalanges	foetus				
	left ulna/fibula	9 month foetus				
	left ulna	9 monthfoetus				
	left ulna/right ulna	8 month foetus				
	right ulna	months				
	left ulna	foetus/ neonate				
	femur		c. 1 year			
	left humerus		c. 1 year			
	distal radius				c. 16	
S2 L4	mandible		c. 4-5			
	teeth/occipital/atlas		c. 3			
	mandible		c. 6 months			
	mandible/occipital		c. 2			
	mandible		c. 18 months			
	scapulae			c. 5		11
	maxilla			c. 6		
	4 loose teeth			c. 10		
	1 loose tooth/vertebrae			c. 7-8		
	ischium/left pubis/fibula	foetus/neonate				
	left pubis/right pubis	foetus/neonate				
S2 L5	mandible/maxilla				c. 13	
	mandible/occipital			c. 5		
	mandible/vertebrae/left clavicle			c. 7-8		
	left clavicle			c. 7-8		
	mandible/occipital			c. 5		
	mandible/vertebrae		c. 2			
	mandible/left clavicle		c. 2-3			
	mandible/vertebrae/radius			c. 6		
	mandible			c. 6		17
	mandible/left femur		c. 18 months			
	mandible		c. 6 months			
	mandible			c. 5		
	mandible/right clavicle			c. 10		

Tomb N, Hili Gardens: Evidence for Age at Death Children

Section/ Level	Bone/Tooth	Foetus/ Neonate	Infant	Child	Adolescent	Total Children
	right clavicle/radius/left ulna			c. 10		
	humerus/radius		c. 4			
	right humerus		c. 4			
	1st metatarsal/phalanges foot				c. 15	
S3 L4	mandible		c. 18 months			
	mandible/vertebrae			c. 5		
	mandible/maxilla/left humerus		c. 3			
	mandible/left tibia	under 6 months				
	humerusleft humerus/femur		c. 9 months			
	mandible+loose teeth		c. 18 months			
	mandible/clavicle/left humerus		c. 9 months			
	maxilla/left humerus		c. 4			16
	ulna/femur/fibula		c. 1 year			
	2 loose teeth/right humerus			c. 9-10		
	4 loose teeth/vertebrae		c. 2			
	vertebrae			c. 7-8		
	ulna/femur/fibulae	foetus/neonate				
	left humerus	neonate				
	fibula	foetus				
	left ulna/left tibia/fragment tibia		c. 6 months			
S3 L5	mandible+loose teeth			c. 7-8		
	loose tooth				c. 12	
	loose tooth/right femur/right tibia		c. I year			
	right femur		c. 1 year			
	3 loose teeth/innominate			c. 9-10		
	loose tooth/left 1st metacarpal				c. 15	
	femur/right femur			c. 6-7		
	loose tooth			c.6-7		
	loose tooth/vertebrae/left femur		c. 2			15
	vertebrae/right clavicle		c. 4			
	right clavicle			c. 5		
	ulna/right femur/left femur/right		c. 6 months			
	ulna/left ulna/left femur/right tibia	foetus/neonate				
	ulna/right tibia	foetus/neonate				
	left humerus	foetus/neonate				
S3/4 L5	mandible/left humerus	neonate				
	ulna/right ulna	foetus/neonate				
	ischium			c. 6		
	2 loose teeth/vertebrae/left ulna		c. 3			
	left ulna		c. 3			12
	3 loose teeth/vertebrae			c. 7-8		
	loose tooth				c.11	
	radius	6 month foetus				
	radius	7½ month foetus				
	radius	8½ month foetus				
	radius/left ischium		c. 2			
	hand/foot phalanges				c. 15	
S4 L3	maxilla+loose teeth/vertebrae		2-5			
	maxilla+loose teeth		18 months - 5			
	3 loose teeth			c. 6		
	3 loose teeth			c. 10		
	1 loose tooth			c. 8		9
	1 loose tooth/right humerus		c. 1			
	2 loose teeth				c. 11	
	left humerus/fibula	foetus/neonate				
	metacarpals/humerus				c. 15	
S4 L4	mandible+loose teeth			c. 10		
	mandible				c.12	
	humerus/right humerus/pair radii			c. 5		
	mandible/right ischium			c. 5		
	mandible+loose teeth		c. 4			
	ischium		c. 4-5			
	mandible			c. 11		
	mandible+loose teeth				c. 12	
	mandible/maxilla+loose teeth		c. 3-4			
	vertebrae/pair humeri/right ulna		c. 2-3			
	right humerus/radius/left tibia		c. 2			
	right humerus/radius		c. 2			
	mandible/left humerus		6 months			

Tomb N, Hili Gardens: Evidence for Age at Death Children

Section/ Level	Bone/Tooth	Foetus/ Neonate	Infant	Child	Adolescent	Total Children
	mandible/maxilla+loose teeth			c. 6-7		
	mandible				c. 12	
	mandible			c. 6		
	mandible			c. 6		28
	maxilla/vertebrae/right ischium			c. 7		
	2 loose teeth				c. 16	
	2 loose teeth			c. 8		
	radius/left tibia	foetus/neonate				
	left tibia	neonate				
	left humerus	7 month foetus				
	tibia	8 month foetus				
	right tibia	9 month foetus				
	radius/right ulna	5 month foetus				
	pair radii		9 months			
	left tibia		c. I year			
S4 L5	mandible+loose teeth			c. 9-10		
	mandible/occipital/left humerus		c. 2-3			
	humerus		c. 3-5			
	humerus/left humerus		c. 3-4			
	humerus/left humerus			c. 6-8		13
	loose teeth			c. 6-8		
	9 loose teeth/clavicle				c. 10-12	
	2 loose teeth				c. 14	
	right humerus	birth-6 months				
	right humerus	birth-6 months				
	humerus	8 month foetus				
	left ulna	7 month foetus				
	phalanges/right tibia				c. 14-17	
S4 L6	mandible			c. 10		
	mandible+loose teeth/vertebrae		c. 3-5			
	4 loose teeth/right humerus				c. 13-15	
	loose teeth/vertebrae			c. 6-8		
	loose teeth			c. 6-8		9
	loose teeth			c. 6-8		
	4 loose teeth		c. 2-3			
	loose teeth		c. 4-5			
	left radius/right radius				c. 16	
Total		36	66	52	21	175
% of all children		20%	38%	30%	12%	100%

Section/ Level	Bone/Tooth	Young Adult (17-35)	Middl Aged (36-45)	Old Adult (45+)	Adult	Total Adults	Individuals Age Unknown	Total No. Non Immature
S1 L3	mandible				3		5	
	maxillae						3	
	scapula				4		3	
	clavicle				1		4	
	humerus						3	
	radius						6	
	ulna				1		2	
	hands				4		4	
	pelvis			1			1	
	femur						2	
	fibula				2		1	
	feet				2		3	
Summary				1	4	5	3	8
S1 L4	maxillae						2	
	vertebrae				1		1	
	clavicle						1	
	scapula						1	
	humerus						1	
	ulna						1	
	hands				3		1	
	feet				1		1	
Summary					3	3	1	4
S2 L3/4	mandibles	1			23		11	
	maxillae				2		18	
	clavicle	2			2		32	
	scapula				13		14	
	humerus	1			7		3	
	radius				2		24	
	ulna				26		11	
	hands				16		1	
	pelvis	2	1				7	
	femur				18			
	fibula				11		4	
	feet				27			
Summary		2	1		27	30	7	37
S2 L4	mandible				1		2	
	maxillae						8	
	clavicle				2		4	
	scapula				2		3	
	humerus				1		8	
	radius				2		4	
	ulna				3		5	
	hands				3			
	pelvis				1		2	
	femur				1		5	
	fibula				2		2	
	feet				2		5	
Summary					3	3	6	9
S2 L5	mandible				19		3	
	maxillae						13	
	clavicle	2			3		27	
	scapula				8		19	
	humerus				5		11	
	radius	1			19			
	ulna				15		14	
	hands				17		3	
	pelvis	2	1	2			14	
	femur				24		3	
	fibula	2			13			
	feet				27		5	
Summary		2	1	2	27	32	0	32
S3 L4	mandible	1			1		8	
	maxilla						8	
	clavicle	1					1	
	scapula						8	
	humerus				2		2	
	radius				4		1	
	ulna	1			2		7	
	hands				9			
	pelvis		1	1			4	
	femur				7		4	
	fibula				7		12	
	feet				10		6	
Summary		1	1	1	10	13	6	19
S3 L5	mandible				6		4	
	maxilla						6	
	clavicle				2			
	scapula				1		9	
	humerus				5		5	

Section/ Level	Bone/Tooth	Young Adult (17-35)	Middl Aged (36-45)	Old Adult (45+)	Adult	Total Adults	Individuals Age Unknown	Total No. Non Immature
	radius				7		10	
	ulna				8		2	
	hands				8		4	
	pelvis	1		2			1	
	femur				8			
	fibula				7			
	feet				8		6	
Summary		1		2	8	11	6	17
S3/4 L5	mandibles				4		5	
	maxillae						6	
	clavicle				1		11	
	scapula				8		3	
	humerus				10		3	
	radius				6		5	
	ulna				7			
	hands				7		3	
	pelvis	1		1			4	
	femur				7			
	fibula				8			
	feet				12		2	
Summary		1		1	12	14	0	14
S4 L3	mandible				1			
	maxillae				2		3	
	clavicle						4	
	scapula	1					3	
	humerus						4	
	radius						4	
	ulna				2			
	hands				4		6	
	pelvis						4	
	femur				2			
	fibula				2			
	feet				5		3	
Summary		1			5	6	4	10
S4 L4	mandibles				9		10	
	maxillae						11	
	clavicle	2			5		17	
	scapula				10		18	
	humerus				7		2	
	radius				16			
	ulna				13		12	
	hands				20		12	
	pelvis		2	1	4		7	
	femur				12		6	
	fibula				8		7	
	feet				24		7	
Summary		2	2	1	24	29	3	32
S4 L5	mandibles	2			21		6	
	maxillae	1			3		7	
	clavicle	1					13	
	scapula				2			
	humerus				13			
	radius				20		1	
	ulna	1			34		5	
	hands				30		4	
	pelvis	2	2	1			2	
	femur	1			51			
	fibula				2			
	feet				35		9	
Summary		2	2	1	51	56	0	56
S4 L6	mandibles				9		9	
	maxillae				2		5	
	clavicle	1			2		10	
	scapula				3			
	humerus				8		8	
	radius				9		7	
	ulna				10		6	
	hands				31			
	pelvis	2	1				1	
	femur				15			
	feet							
Summary		2	1		31	34	0	34
Total		14	8	9	205	236	36	272
% of all adults		6%	3%	4%	87%	100%		

Tomb N, Hili Gardens: Sexable Adults

Section/ Level	Bone	Female	?Female	??	?Male	Male	Sexable Adults
S1 L3	brow ridge				2		
	mastoid process		1		1		
	scapula	1		1		1	
	sciatic notch						
Summary		1	1	1	2	1	6
S1 L4							
Summary	no information						0
S2 L3	frontal		1		3	2	
	scapula	4		7	2	3	
	humerus	2		3	1		
	radius		1		2		
	pelvis	3				1	
	femur	9	1	2	3	5	
Summary		9	1	7	3	5	25
S2 L4	humerus	1					
	pelvis					2	
Summary		1				2	3
S2 L5	mastoid process	8				7	
	scapula	2		2	1	3	
	humerus	2		1		1	
	pelvis	4				2	
	femur	3	6	7	5	5	
Summary		8	6	7	5	7	33
S3 L4/4	cranium					1	
	sacrum	1					
	clavicle	2		1			
	humerus	1		1			
	pelvis	1				2	
	femur	5	1	1	1	2	
Summary		5	1	1	1	2	10
S3 L5	scapula	1					
	humerus	2					
	pelvis	1				1	
	femur	3	1	1	1	1	
Summary		3	1	1	1	1	7
S3/4 L5	scapula	1		1		1	
	humerus	1		2			
	pelvis	1				1	
	femur	1		2	1	1	
Summary		1		2	1	1	5
S4 L3	mastoid process					2	
	femur	1				1	
Summary		1				2	3
S4 L4	mastoid process	4			2	3	
	sacrum					1	
	scapula	3		2		1	
	humerus	3				1	
	pelvis	3				3	
	femur	7	1	1	1	3	
Summary		7	1	2	2	3	15
S4 L5	mastoid process	10				6	
	sacrum	2				3	
	scapula					2	
	pelvis	2				4	
	femur	9	4	2	3	6	
Summary		10	4	2	3	6	25
S4 L6	frontal	2				8	
	mastoid process	4				5	

Tomb N, Hili Gardens: Sexable Adults

Section/ Level	Bone	Female	?Female	??	?Male	Male	Sexable Adults
	sacrum					1	
	scapula					3	
	ulna					2	
	pelvis	1				2	
Summary		4				8	12
Total		49	15	23	18	39	144
% of all sexable adults		34%	10%	16%	13%	27%	100%

Section/ Level	1st Metatarsal (L)	1st Metatarsal (R)	2nd Metatarsal (L)	2nd Metatarsal (R)	3rd Metatarsal (L)	3rd Metatarsal (R)	4th Metatarsal (L)	4th Metatarsal (R)	5th Metatarsal (L)	5th Metatarsal (R)
S1 L3	none	none	none	none	none	none	none	none	none	none
S1 L4	none	none	none	none	none	none	none	none	none	none
S2 L3/4	162.03	161.70	none	none	158.46	169.72	180.99	161.03	155.93	none
	178.98	149.48			160.52	155.16	171.47		164.59	
	160.37	158.62			159.09	161.64	164.91		155.64	
	178.43	159.41				154.77			161.06	
	172.70	158.59								
	169.66	156.30								
	161.08	173.76								
	167.80	149.48								
		173.42								
S2 L4	none	none	none	none	none	none	none	none	none	none
S2 L5	179.64	161.44	166.86	174.87	149.71	163.63	none	170.56	163.97	169.53
	172.57	175.71	175.32	163.42	163.48	168.34		173.11	166.11	157.4
	161.48	164.62	170.88		166.75	152.62		156.63	165.36	169.84
	161.44	176.21	173.32		157.17	157.90				170.15
	160.81	175.54	173.92							
	167.86	173.34								
	166.87	169.09								
	167.37	158.34								
		176.45								
S3 L5	167.04	161.41	161.97	none	none	none	none	none	177.96	166.26
	165.21	157.33								
S3/4 L5	170.33	170.40	174.89	none	none	162.31	none	164.31	151.90	164.58
	160.66	170.72	166.77			168.88		160.53		
	160.66		163.39					165.55		
S4 L3	none	none	none	none	none	none	none	none	none	none
S4 L4	166.06	161.63	157.90	163.60	162.32	none	169.37	163.09	174.98	166.68
	151.87	160.29	162.17		155.35				174.67	165.22
	151.00	167.19	169.61		165.68				159.33	
	155.43	169.02			163.31					
	163.41									
S4 L5	161.90	167.49	180.93	166.38	166.87	171.52	170.48	189.96	159.45	160.40
	169.00	169.78		172.41		171.32	177.59	164.17	159.76	174.82
	164.03	169.66					172.43	165.65		169.09
	168.33	147.80					167.85	159.55		
	166.99	163.48					160.83			
	170.87	164.74					172.08			
	170.53	183.42					166.27			
	177.07	165.22					158.15			
	168.53	151.68					167.74			
	179.20	157.18								
		157.41								
		163.46								
S4 L6	160.82	172.77	173.87	165.31	163.51	171.25	none	155.15	154.05	162.24
	166.82	154.34	172.58	168.34				162.85		159.43
	154.74	165.04		167.24				159.38		162.53
		159.18		172.23				166.78		164.80
		175.61		170.47						161.86
		165.38								167.31
		154.04								167.61
		163.31								173.57
Average	166.14	164.36	169.63	168.43	160.94	163.77	169.24	164.89	162.98	165.96

Tomb N, Hili Gardens: Ante Mortem Tooth Loss

	S1 L3	S1 L4	S2 L3/4	S2 L4	S2 L5	S3 L4	S3 L5	S3/4 L5	S4 L3	S4 L4	S4 L5	S4 L6	Total
MANDIBLES*													
Number of fragments	12	0	60	6	65	13	16	12	1	36	66	42	330
Fragments with AM loss	8	0	49	5	48	10	14	9	1	28	43	29	245
% fragments with AM loss	**67**	**0**	**82**	**83**	**74**	**77**	**88**	**75**	**100**	**78**	**65**	**69**	**74**
Total tooth places present	67	0	316	29	310	75	75	75	6	175	310	194	1638
Places lost AM	27	0	184	11	154	22	39	34	5	76	129	97	783
% places lost AM	**40**	**0**	**58**	**38**	**50**	**29**	**52**	**45**	**83**	**43**	**42**	**50**	**48**
Total anterior places	31	0	98	9	114	40	18	34	1	67	97	56	566
Anterior places lost AM	6	0	22	0	25	7	2	6	1	4	14	12	99
% anterior places lost AM	**19**	**0**	**22**	**0**	**22**	**18**	**11**	**18**	**100**	**6**	**14**	**21**	**17**
Total premolar places	20	0	89	9	78	23	24	19	2	50	88	55	459
Premolar places lost AM	8	0	54	1	37	6	10	13	1	27	34	24	217
% premolar loss AM	**40**	**0**	**61**	**11**	**47**	**26**	**42**	**68**	**50**	**54**	**39**	**44**	**47**
Total molar places	16	0	129	11	118	12	33	22	3	58	125	83	613
Molar places lost AM	13	0	108	10	92	9	27	15	3	45	81	61	467
% molar loss	**81**	**0**	**84**	**91**	**78**	**75**	**82**	**68**	**100**	**78**	**65**	**73**	**76**
MAXILLAE*													
Number of fragments	3	2	23	12	22	15	7	10	11	19	34	15	173
Fragments with AM loss	1	1	11	8	8	5	0	6	6	10	17	5	78
% fragments with AM loss	**33**	**50**	**48**	**67**	**36**	**33**	**0**	**60**	**55**	**53**	**50**	**33**	**45**
Total tooth places present	13	9	118	60	105	65	32	44	44	77	140	53	760
Places lost AM	1	1	30	12	12	8	0	13	13	17	34	15	156
% places lost AM	**8**	**11**	**25**	**20**	**11**	**12**	**0**	**30**	**30**	**22**	**24**	**28**	**21**
Total anterior places	9	7	53	35	67	38	20	24	22	50	69	31	425
Anterior places lost AM	1	0	8	4	4	2	0	5	7	9	6	7	53
% anterior places lost AM	**11**	**0**	**15**	**11**	**6**	**5**	**0**	**21**	**32**	**18**	**9**	**23**	**12**
Total premolar places	4	2	38	19	31	22	10	15	13	23	38	16	231
Premolar places lost AM	0	1	9	3	8	4	0	4	4	8	13	6	60
% premolar loss AM	**0**	**50**	**24**	**16**	**26**	**18**	**0**	**27**	**31**	**35**	**34**	**38**	**26**
Total molar places	0	0	27	6	7	5	2	5	9	4	33	6	104
Molar places lost AM	0	0	13	5	0	2	0	4	2	0	15	2	43
% molar loss	**0**	**0**	**48**	**83**	**0**	**40**	**0**	**80**	**22**	**0**	**45**	**33**	**41**

* = Adult fragments only

Tomb N, Hili Gardens: Ante Mortem Tooth Loss

	S1 L3	S1 L4	S2 L3/4	S2 L4	S2 L5	S3 L4	S3 L5	S3/4 L5	S4 L3	S4 L4	S4 L5	S4 L6	Total
JAW FRAGMENTS*													
Number of fragments*	15	2	83	18	87	28	23	22	12	55	100	57	503
Fragments with AM loss	9	1	60	13	56	15	14	15	7	38	60	34	323
% fragments with AM loss	**60**	**50**	**72**	**72**	**64**	**54**	**61**	**68**	**58**	**69**	**60**	**60**	**64**
Total tooth places present	80	9	434	89	415	140	107	119	50	252	450	247	2398
Places lost AM	28	1	214	23	166	30	39	47	18	93	163	112	939
% places lost AM	**35**	**11**	**49**	**26**	**40**	**21**	**36**	**39**	**36**	**37**	**36**	**45**	**39**
Total anterior places	40	7	151	44	181	78	38	58	23	117	166	87	991
Anterior places lost AM	7	0	30	4	29	9	2	11	8	13	20	19	152
% anterior places lost AM	**18**	**0**	**20**	**9**	**16**	**12**	**5**	**19**	**35**	**11**	**12**	**22**	**15**
Total premolar places	24	2	127	28	109	45	34	34	15	73	126	71	690
Premolar places lost AM	8	1	63	4	45	10	10	17	5	35	47	30	277
% premolar loss AM	**33**	**50**	**50**	**14**	**41**	**22**	**29**	**50**	**33**	**48**	**37**	**42**	**40**
Total molar places	16	0	156	17	125	17	35	27	12	62	158	89	717
Molar places lost AM	13	0	121	15	92	11	27	19	5	45	96	63	510
% molar loss	**81**	**0**	**78**	**88**	**74**	**65**	**77**	**70**	**42**	**73**	**61**	**71**	**71**

* = Adult fragments only

Tomb N, Hili Gardens: Dental Pathology

Section	Level	Bone	Completeness	No. Frags.	Age	Sex	Pathology	Origin of Lesion
2	5	mandible	right/part left	1	17+		depression internal mandible to R mental spine, cause unclear, no other pathology	?
4	6	maxilla	anterior left	1			advanced wear - angled towards the palatal surface - root canal exposed	?
2	5	mandible	left	1	17+		retained deciduous? tooth lying below & between C & PM1; grossly enlarged and infected socket for M2, pitting at PM2 & M1	?/ alveolus/ socket
3	4	maxilla	right	1			abscess base C, PM1 erupted posterior to C into palate	?/socket
2	4	maxilla	left	1			bone around socket for central incisor and next 2 missing teeth appears very infected & eroded	alveolus
2	5	mandible	part right	1			pitting around and between C & PM1	alveolus
2	5	mandible	right/part left	1	17+		pitting of alveolar bone from R PM1 to L I2, much resorption, height mandible 16 mm	alveolus
2	5	mandible	right	1	17+		pitting at both incisors & canine, socket of I2 very shallow, possibly shed	alveolus
2	5	mandible	part right	1			resorption & pitting at I2	alveolus
2	5	mandible	posterior right	1			infection with pitting around M3	alveolus
2	5	mandible	right	1	17+		much irregular growth at M1 - normal remodelling after loss?	alveolus
2	5	mandible	posterior left	1	17+		pitting alveolar surface at M1, M2	alveolus
2	5	mandible	posterior left	1	17+		resorption + infection M2, socket shallow	alveolus
2	5	mandible	posterior left	1	17+		alveolar bone not fully closed at M2, irregular growth - healing or pathology?	alveolus
2	3/4	mandible	R & part L	1	17+		pitting & resorption at R M3, resorption R PM2. Resorption 17 mm	alveolus
2	3/4	mandible	L/central	1	?		pitting at area of both L premolars, resorption at L PM1	alveolus
2	3/4	mandible	anterior L/central	1	?		bone destruction at left lateral incisor, reactive growth at 3 central teeth	alveolus
2	3/4	mandible	posterior right	1	17+		pathological change of bone around socket	alveolus
2	3/4	mandible	posterior right	1			pathological change at socket for M1, tooth still in situ?, localised loss of height	alveolus
2	3/4	mandible	left	1			diseased bone around M1 M2	alveolus
2	3/4	mandible	posterior left	1	17+		healing at M2, M3, pathological change at M1	alveolus
2	3/4	mandible	part right	1	?		large area pathological change - loss of bone around PM1	alveolus
2	3/4	maxilla	right	1			much evidence periodontal disease, pitting at I2, PM1, PM2	alveolus
4	4	mandible	part right	1	c. 5		localised area pitting & swelling external surface around M1/M2, no obvious infection of rest of alveolar area	alveolus
4	4	mandible	left posterior	1	17+		marked area infection over M2/M3, raised pitted crest on external side	alveolus
4	6	mandible	left	1	17+		much bone destruction over 3 molars - very diseased	alveolus
4	6	mandible	anterior right	1			gross infection on external surface around sockets for teeth present - the teeth may already have been lost, although the shape of the socket on the alveolar crest are just discernible - sockets almost totally destroyed on the external surface	alveolus
3/4	5	maxilla	left	1			pitting over external alveolar area of C	alveolus
4	4	maxilla	anterior left	1			alveolar area around area of missing teeth pitted & misshapen	alveolus
2	5	mandible	part right	1	17+		abscess root of M3 10 mm diameter exiting anterior surface mandible, area infection & bone destruction around - 25 x 22 mm	alveolus/ socket
2	5	mandible	part right	1	17+		abscess at base of PM 1, pitting at M1	alveolus/ socket
2	5	mandible	right/part left	1			socket for R I2 shallow & infected with abscess, socket PM2 possible abscess, pitting at R PM1 & central incisors	alveolus/ socket
2	5	mandible	left	1	17+		badly infected mandible, abscesses at I2?, C, PM1 & PM2. sinus & infected bone anterior surface below PM2. gross infection area PM2 & M1 with much bone destruction, infection posterior side, infection PM1 to M3	alveolus/ socket
2	5	mandible	left	1			abscess at base of PM1, appears to have protruded anterior wall. PM2 broken pm but discoloured. Pitting of alveolar crest between PM1 & PM2	alveolus/ socket
2	5	mandible	left	1			rounded abscess pocket with pitting at C, pitting at I2	alveolus/ socket

Section	Level	Bone	Completeness	No. Frags.	Age	Sex	Pathology	Origin of Lesion
2	5	maxilla	right	1			pitting PM1/PM2, extends to anterior surface, ?abscess at I2	alveolus/ socket
2	3/4	maxilla	left	1			much periodontal disease, socket I1 shallow & pitted, base C pitted, socket PM1 shallow, pitting at PM2, M1	alveolus/ socket
3	4	mandible	right	1			marked loss alveolar height around PM2 & large abscess, large area infected bone external surface, mandible body much thicker, small sinus below foramen, area infection 30 x 20. Socket M1 does not appear healthy	alveolus/ socket
4	4	maxilla	anterior left	1			abscess socket I2, extruding into external surf. External bone around I1 and I2 infected	alveolus/ socket
4	6	maxilla	anterior left	1			gross infection on external surface at M1 & M2, large abscess at M! extending through to external surface	alveolus/ socket
1	3	mandible	right/centre	1			large cavity in alveolar bone at site of PM1 - abscess? - tooth probably lost am	socket
1	3	mandible	part right/central	1	adult		pus sinus 6 mm, exiting inferior mandible to right of chin	socket
1	3	mandible	posterior left	1	c. 4		large carious lesion occlusal surface of 2nd deciduous molar	socket
1	3	mandible	part right	1	adult?		large cavity in alveolar bone at site of PM1 - abscess? - tooth probably lost am	socket
2	5	mandible	right/part left	1	17+		socket R I2 healing, socket for PM1 enlarged with abscess, socket of PM2 resorbed, pitting at R I1	socket
2	5	mandible	right	1			abscess pocket at root of PM1, pitting at M1	socket
2	5	mandible	posterior right	1	17+		pitting in the base of socket of PM1	socket
2	5	mandible	right	1	17+		socket for PM2 enlarged, possible abscess	socket
2	5	mandible	right	1			abscess pocket at root, raised area irregular growth & pitting around foramen above mental spine	socket
2	5	mandible	right	1	17+		possible abscess pocket at base of PM1	socket
2	5	mandible	right	1			abscess at L I1; ?abscess at PM1	socket
2	5	mandible	right	1			abscess at L I1; ?abscess at PM1	socket
2	5	mandible	part right	1			small abscess at apex root at PM1	socket
2	5	mandible	posterior left	1	17+		socket M3 pitted and shallow	socket
2	5	mandible	left	1	17+		small abscess I2, sinus running into C. abscess PM1, emerging anterior surface, socket PM2 healing, socket M2 badly infected & misshapen, socket M3 enlarged with abscess & sinus running into base	socket
2	5	mandible	left	1	17+		sockets for I2 & C resorbed, that of C distorted with abscess pocket at root	socket
2	5	mandible	left	1			socket for PM2 enlarged and abscessed with sinus running into interior, no obvious outlet, socket for I2 enlarged, abscessed & infected	socket
2	5	mandible	left	1			abscess at base of I2, pitting at C, mandible greatly resorbed, height at mental foramen 12.85 mm	socket
2	5	mandible	left	1	17+		gross abscess at base of C & PM1 through to anterior side, probable source of infection C, large abscess pocket at M2 with pitting	socket
2	5	mandible	left	1	17+		abscess pocket at base of left PM2, sinus running inferiorly and posteriorly into mandible. No obvious outlet although bone damaged pm	socket
2	5	mandible	left	1	17+		abscess pocket & sinus running from base of PM2, bone resorbed but socket not obviously diseased, infection healed?	socket
2	5	mandible	anterior left	1			heavy attrition C 3/4 crown worn away, through to pulp chamber abscess at base of root	socket
2	5	mandible	posterior left	1	17+		small abscess pocket at base of M3, socket resorbed	socket
2	5	maxilla	right	1			very shallow & infected socket for C, may have already been lost am, large pus pocket I1 (7 mm long), abscesses PM1 and I2, alveolar process very resorbed	socket
2	5	maxilla	right	1			socket for C resorbed and abscessed	socket
2	5	maxilla	right	1			large abscess at base of C	socket
2	5	maxilla	left	1			small pockets infection bases central incisors	socket
2	5	maxilla	anterior left	1			abscess pockets visible bases sockets I1 & C	socket
2	5	maxilla	left	1			alveolar bone resorbed, abscess base I2, sinus through anterior surface above tooth	socket
2	5	maxilla	left	1			large abscess pocket at base of C, sinus running into nasal cavity?, abscesses left I1 & I2	socket

Section	Level	Bone	Completeness	No. Frags.	Age	Sex	Pathology	Origin of Lesion
2	5	maxilla	anterior left	1			alveolar bone resorbed, abscess I2 with sinus through to maxilla wall	socket
2	3/4	mandible	posterior R	1	17+		abscess sinus running from the base of M2 - no evidence of exit	socket
2	3/4	mandible	right	1			socket of M1 thickening of bone, reduction in height M1, 2 mm	socket
2	3/4	mandible	left	1			resorption at M1,M2, causing slanting of PM1, PM2 & M3, only ½ socket for C with pathological change	socket
2	3/4	maxilla	left	1			pathological change in sockets for both premolars	socket
2	3/4	maxilla	left	1			pus cavities at base sockets I1 & PM2, PM1 socket closing from base & pitted with react bone, root only of PM2, attrition	socket
2	3/4	maxilla	left	1			abscess within root socket of PM1, base root filled with bony growth, tooth present but soon to be expelled?	socket
2	3/4	maxilla	left posterior	1	17+		diseased bone within socket M3	socket
3	4	mandible	right	1			large abscess base M1, socket PM2 healing, infection around PM1 & abscess, socket closing?	socket
3	4	mandible	right	1			abscess pocket base lateral incisor & PM1	socket
3	4	mandible	left	1			socket M1 enlarged, diseased & form destroyed, abscess present	socket
3	4	mandible	left	1			infection socket I2, destruction of bone with sinus in palate behind place for C	socket
3	5	mandible	left	1			large socket for M2 - abscess?	socket
3	5	mandible	right	1			abscess PM1	socket
3	5	mandible	right	1	17+		abscess PM2	socket
3	5	maxilla	right	1			socket M1 infected?	socket
3	5	maxilla	anterior right	1			abscess base root C, abscess? base root I2	socket
3	5	maxilla	anterior right	1			abscess base root PM1	socket
4	3	maxilla	posterior right	1			abscess base M1 & M2	socket
4	3	maxilla	part right	1			abscess root PM1, sinus through to palate where there is evidence of infection	socket
4	3	maxilla	central/left	1			abscess root I2	socket
4	3	maxilla	left	1			abscess root C	socket
4	4	mandible	right	1	17+		abscess at base of I2	socket
4	4	mandible	part right	1			pitting & reactive growth socket M1, unclear if tooth was in situ	socket
4	4	mandible	part right	1			socket M1 appears shallow, irregular & infected	socket
4	4	mandible	posterior right	1	17+		sockets of M3, M2 abscessed	socket
4	4	maxilla	anterior right	1			abscess at base of C?	socket
4	4	maxilla	anterior right	1			sockets incisors infected, enlarged & shallow. Teeth probably inclined inwards	socket
4	4	maxilla	anterior left	1			large abscess base socket I2, extending far into bone, socket I1 shallow, tooth probably inclined inwards.	socket
4	5	mandible	right	1	17+		abscess at M2	socket
4	5	mandible	anterior right	1			abscess at I1	socket
4	5	mandible	part right	1			abscess at C	socket
4	5	mandible	anterior right	1			abscess at C	socket
4	5	mandible	almost complete	1	17+		abscess at right C	socket
4	5	mandible	anterior left	1			abscess at I1	socket
4	5	mandible	part left	1			abscess at socket for C	socket
4	5	maxilla	anterior right	1			single abscess in base of sockets for both incisors	socket
4	5	maxilla	left	1			abscess pocket base PM1 with sinus extruding into external surface	socket
4	6	mandible	right	1			abscess? base socket PM2	socket
4	6	mandible	complete	1	17+		abscesses both lateral incisors, much resorption	socket
4	6	mandible	left	1			abscess at the base of PM1	socket
4	6	maxilla	posterior right	1	17+		gross infection at the base of both sockets - at 2nd premolar infection extends to external surface	socket

Section	Level	Bone	Completeness	No. Frags.	Age	Sex	Pathology	Origin of Lesion
3/4	5	mandible	posterior left	1	21+		root abscess base M1	socket
3/4	5	mandible	central/left	1	21+		abscess base left I2	socket
3/4	5	mandible	anterior right/anterior left	1			large abscess base L C, smaller ones bases both I2s, abscess? at R PM1	socket
3/4	5	mandible	anterior right/anterior left	1			abscess pockets at base R I1 & L C, invading external surface, possible further one at base L I2	socket
3/4	5	maxilla	anterior right/anterior left	1			abscess at base C	socket
3/4	5	maxilla	left	1			abscess base of C	socket
1	3	maxilla	anterior left	1	adult		heavy wear canine, ?carious lesion PM1, whole crown missing	tooth
1	3	upper right deciduous 1st molar	roots damaged	1	c. 2-8		small (Grade 1) occlusal caries - disto-palatal cusp	tooth
2	5	mandible	right	1	c. 7-8		carious lesion (Grade 1) at M1 on occlusal surface, and underlying enamel	tooth
2	3/4	mandible	right	1	17+		abscess sinus running from socket I1 to I2, resorption minimum height 15 mm	tooth
2	3/4	maxilla	left	1	c.7		large (Grade 3) occlusal caries deciduous 2nd molar	tooth
2	3/4	lower right deciduous m1	slight damage to roots	1	c. 4-6		large (Grade 3)occlusal caries, mesolingual cusp	tooth
2	3/4	premolar	part crown missing	1	adult		moderate (Grade 2) caries CEJ - advanced wear - 2/3 crown worn down to pulp chamber	tooth
2	3/4	upper right M1	fragment crown	1	adolescent?		caries (Grade ?) distal CEJ - degree unclear - only part of tooth remaining	tooth
4	3	upper right M3	slight damage to roots	1	adult		small (Grade 1) contact caries	tooth
4	3	lower left PM2	complete	1	13+		moderate (Grade 2) caries (deep into crown) - occlusal - probably originating in fissure	tooth
4	3	lower left M1?	crown and roots damaged	1	10-17?		moderate (Grade 2) caries buccal CEJ	tooth
4	4	upper right deciduous m2	mesiobuccal root missing	1	c. 3		moderate (Grade 2) caries - mesial crown	tooth
4	4	lower right deciduous m2	complete	1	c. 3		moderate (Grade 2) caries mesial crown	tooth
4	5	lower M2	mesial 1/2 crown, roots broken off	1	c. 14		massive (Grade 4) caries in dentine under enamel - occlusal - probably originating from fissure but tooth incomplete	tooth
4	5	lower M2	roots broken off	1	17-25		moderate (Grade 2) occlusal caries - fissure between mesial cusps	tooth
4	5	lower left canine	crown damaged	1	14+		moderate (Grade 2) caries - mesial CEJ	tooth
4	5	lower right m1	complete	1	c. 3		moderate (Grade 2) caries - distal CEJ	tooth
4	5	lower right m1	slight damage crown & root	1	c. 3		possible small (Grade 1) caries distal CEJ	tooth
4	6	mandible	right	1	17+		caries (Grade 1) distal surface of M2	tooth
4	6	lower left M2	both crown and root damaged	1	?		large (Grade 3) occlusal? Caries covering most of buccolingual crown	tooth
3/4	5	upper left M1	enamel damaged, roots missing	1	17-25		large (Grade 3) occlusal caries	tooth
4	3	lower left M1	root damaged	1	?under 17		large (Grade 3) occlusal caries - mostly internal	
				140				

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	5	feet	calcaneus	complete right	1	20+		moderate lipping around facet for body of talus, more marked posteriorly, area of bone destruction on articular surface
2	5	feet	calcaneus	complete left	1	20+		gross osteophytic growth at posterior side of sustentaculum tali - c. 15x20 mm
2	3/4	feet	calcaneus	complete left	1			double facets for middle & anterior talal surface, pitting in centre middle articulation, lipping medial process on posterior surface
2	3/4	feet	calcaneus	complete left	1			moderate lipping posterior & middle talal surfaces
2	4	feet	calcaneus	complete left	1	15+		moderate lipping around superior part of facet for cuboid
2	3/4	feet	metatarsal 1st	complete or alcp	4	15+		path. change to the head, 1 slight lipping, 1 moderate, 1 with bone destruction & 1 with eburnation
2	6	feet	metatarsal 1st	complete left	1	15+		lipping & pitting inferior posterior edge head
2	5	feet	metatarsal 1st	complete right	1	15+		marked lipping around the head
2	5	feet	navicular	complete left	3			deep pits in articular facet for talus
2	5	feet	navicular	complete left	1			1 has lipping at facet for 3rd cuneiform
2	5	feet	navicular	alcp left	1			gross lipping at facets for 2nd & 3rd cuneiforms
2	5	feet	navicular	alcp left	1			gross flattening, lipping & pitting of facet for 3rd cuneiform
2	4	feet	navicular	complete left	1			large osteophyte at margin of facets for 2nd & 3rd cuneiforms - the whole bone appears flattened and worn; 2 with moderate lipping around facet for 2nd cuneiform
2	5	feet	navicular	complete right	3			1 with erosive lesion centre of facet for talus - 5.5 mm diameter; 1with erosive lesion in facet for talus - 2.5 mm; 1 with moderate lipping around facet for 2nd cuneiform
2	5	feet	navicular	complete left	4			1 with large erosive lesion in facet for talus - 12x9 mm & moderate lipping between facets for 2nd & 3rd cuneiforms; 2 with moderate lipping between facets for 2nd & 3rd cuneiforms; 1 with moderate lipping around facet for 2 nd cuneiform
2	6	feet	navicular	complete left	1			1 with area of erosion in the centre of facet for talus with deep pitting
2	5	feet	navicular	complete right	1			marked bone destruction in articular surface for talus and whole bone is porous
2	4	feet	navicular	complete right	1			deep pit (6 x 6 mm) in centre of facet for head of talus
2	4	feet	navicular	complete right	1			1 with large osteophyte superior edge of facet for 1st cuneiform, moderate lipping at latero-medial edge of facet for 2nd cuneiform
2	5	feet	phalanx 1st proximal	complete	2	15+		1 with erosive lesion in centre of facet; 1 with gross destruction of whole of proximal articulation - facet is completely eroded with pitting & lipping.
2	3/4	feet	phalanx 1st proximal	complete or alcp	4	15+		3 with slight or moderate lipping around base, 1 with lipping around base & head
2	5	feet	phalanx 1st proximal	complete	3	15+		2 with erosive lesions on base; 1 with lipping on head
2	4	feet	phalanx 1st proximal	complete	1	15+		area erosion/pitting in proximal articular facet
2	4	feet	phalanx 1st proximal	complete	1	15+		moderate lipping of proximal articular surface
2	5	feet	phalanx distal	complete	1	15+		slight lipping around proximal articulation
1	3/4	feet	phalanx distal 1st	complete	1	15+		lipping around base
1	5	feet	phalanx distal 1st	complete	1	15+		lipping proximal articular surface
2	4	feet	phalanx distal 1st	complete	1	15+		moderate lipping around proximal articular facet
2	5	feet	phalanx distal 1st	proximal articular end only	1	15+		small area of eburnation on articular facet with slight lipping
2	3/4	feet	phalanx middle	complete	2	15+		lipping around base
2	4	feet	phalanx middle	complete	1	15+		marked lipping proximal facet
2	5	feet	phalanx middle	complete	1	15+		1 with moderate lipping around proximal articulation
2	5	feet	phalanx middle	complete	1	15+		lipping around articulation
2	5	feet	phalanx proximal	complete	1	15+		severe erosion in base
2	5	feet	phalanx proximal	complete	1	15+		head distorted, reactive growth proximal to head, base unaffected
2	5	feet	phalanx proximal	complete	1	15+		head distorted and pitted, reactive growth proximal to head, base unaffected
2	6	feet	phalanx proximal	complete	1	15+		marked reactive growth on base - whole proximal end is enlarged and porous - distal 1/2 is unchanged
2	3/4	feet	phalanx proximal	complete	1	15+		gross distortion of head

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Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	3/4	feet	talus	complete left	1			slight lipping on posterior side head
2	3/4	feet	talus	complete left	1			slight lipping on posterior side head & around posterior calcaneal articular surface
2	3/4	feet	talus	complete left	2			extensive lipping on lower edge posterior calcaneal surface
2	5	feet	talus	complete left	1			lipping around posterior, middle and anterior calcaneal surface
2	4	feet	talus	complete left	1			slight lipping around head & talal surface with slight irregularities over whole bone
2	5	feet	talus	complete left	1			gross destruction of head with osteophytes around head
2	3/4	feet	talus	complete right	1			extensive lipping on lower edge posterior calcaneal surface
2	3/4	feet	talus	complete right	1			extensive lipping on lower edge posterior calcaneal surface & moderate lipping posterior edge of head
2	3/4	feet	talus	complete right	1			extensive lipping on lower edge posterior calcaneal surface
2	3/4	feet	talus	alcp right	1			extensive lipping posterior calcaneal surface
2	5	feet	talus	alcp right	1			lipping around facet for calcaneus
2	5	feet	talus	complete right	1			lipping around facet for calcaneus with area of destruction in groove above facet; area of bone destruction on inferior edge of articulation with tibia
2	5	feet	talus	complete left	1			ring-like ridges around head and a small raised circular lesion in the centre
2	5	feet	talus	fragments	3			1 with bone destruction on the articular surface for calcaneus; 1 with severe wear on the inferior surface - eburnation and some bone destruction on the head & lipping on the articulation with calcaneus; 1 with area of bone destruction on articular surface with tibia & slight eburnation
4	4	feet	talus	complete left	1			osteophyte on posterior edge facet for calcaneus
2	3/4	hands	metacarpal	complete	1	15+		severe lipping around head and destruction of bone on articular surface
2	5	hands	metacarpal	fragment with head and shaft	1	15+		slight lipping around head
2	5	hands	metacarpal	fragment with head and shaft	1	15+		gross lipping on palmar surface below head (dorsal side damaged) large area of eburnation with deep pits on head
2	3/4	hands	metacarpal 1st	complete	1	15+		slight lipping around head
2	3/4	hands	metacarpal 1st	complete	1	15+		moderate lipping around head
2	5	hands	metacarpal 1st	complete right	1	15+		moderate lipping lateral palmar proximal edge head
2	5	hands	metacarpal 1st	fragments distal ends right	3	?		slight lipping palmar/proximal edge head
2	5	hands	metacarpal 1st	complete left	1	15+		slight lipping on medial side of head
2	4	hands	metacarpal 2nd	complete right	1	15+		pitting & reactive growth on proximal articular surface
2	5	hands	metacarpal 5th	complete	1	15+		1 with lipping at proximal articulation
2	5	hands	phalanx 1st proximal	complete	1	15+		lipping around head
2	6	hands	phalanx distal	complete	2	15+		lipping around articular edge
2	3/4	hands	phalanx distal	complete	1	15+		lipping around proximal articulation
2	5	hands	phalanx middle	complete	1	15+		slight lipping around proximal articulation
2	3/4	hands	phalanx proximal	complete	1	15+		lipping proximal articulation
2	5	hands	phalanx proximal	complete	1	15+		pitting & bone destruction on head
2	5	hands	trapezium	complete right	1			slight lipping around facet for 1st metacarpal
2	5	hands	trapezoid	complete left	1			moderate lipping posterior part facet for 2nd metacarpal
2	4	lower limbs	femur	fragment condyles	1	17+		1 with lipping around articular edge, 1 with eburnation & grooving
2	3/4	lower limbs	patella	complete left	5			3 with pitting on facets, 1 with lipping around facets, 1 with large pits on anterior surface
2	5	lower limbs	patella	fragments	13			pitting/bone destruction/lipping

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	5	lower limbs	patella	complete or almost complete rights	6			1 (43 mm) with bone destruction & reactive growth on superior part anterior surface, some bone destruction on superior border & between articular facets; 1 (45 mm) with lipping lateral side lateral facet; 1(51 mm) with bone destruction on superior border, lateral articular facet & between facets; 1 (48 mm) with bone destruction/reactive growth on medial facet & between facets, linear lesion across anterior surface; 1 (44 mm) small area bone destruction in each facet; 1 (not measurable) with moderate lipping around articular surface, area bone destruction on superior lateral facet & between facets, osteophytes superior anterior surface
2	5	lower limbs	patella	complete or almost complete lefts	2			1 (52 mm) with slight lipping on lateral edge just inferior to notch & marked osteophytic formation on inferior anterior surface; 1 (49 mm) with pitting & irregular growth on area between facets
2	6	lower limbs	patella	complete or almost complete rights	5			1 with 2 pin-sized holes + lateral articular surface, & much irregular growth anterior surface; 4 with pitting, reactive growth/ bone destruction
2	5	lower limbs	patella	complete right	3			pitting/bone destruction/lipping
2	4	lower limbs	patella	complete right	1			1 with 2 small erosive lesions on lateral facet & osteophytes on anterior surface
2	3/4	lower limbs	patella	complete right	5			pitting and/or lipping
4	6	lower limbs	patella	complete or almost complete rights	4			lipping/bone destruction/growth
2	3/4	lower limbs	tibia	distal ends	2			pitting on talar articular surface & one of these with lipping around edge of articulation
2	3/4	pelvis	innominate	acetabulum	3			lipping around edge (1 moderate, 2 slight)
2	5	pelvis	innominate	fragment with acetabulum	1			pitting and eburnation on acetabulum
2	5	pelvis	innominate	fragment with acetabulum	1			marked area eburnation with wide grooves
2	4	pelvis	innominate	fragment left with acetabulum & greater sciatic notch	1			moderate lipping around rim acetabulum
2	5	skull	mandible	R head mandible	1			slight pitting on articular surface
2	5	skull	mandible	R head mandible	1			flattening, pitting & bone destruction on articular surface
2	5	skull	mandible	R head mandible	1			marked flattening, destruction & pitting on articular surface
2	5	skull	mandible	R head mandible	1			articular area has severe destruction, marked wear, depressed oval area with pitting
2	5	skull	mandible	R head mandible	1			flattening of articular surface, slight pitting, + destruction on distal side
2	5	skull	mandible	L head mandible	1			deep depressed area of bone destruction with pitting inside, slight lipping at anterior and distal edges
2	5	skull	mandible	L head mandible	1			head almost totally destroyed with pitting all over & lipping around, particularly round anterior edge
2	5	skull	mandible	L head mandible	1			oval area of destruction with pitting in centre, slight pitting on anterior edge
2	5	skull	mandible	L head mandible	1			articular area flattened & slightly pitted
2	5	skull	mandible	L head mandible	1			head worn flat on anterior side, slight flattening on superior posterior area with some sporadic destruction
2	5	skull	mandible	L head mandible	1			depressed, pitted area posterior surface of articulation, also pm damage
2	4	skull	mandible	fragments with R head ramus	1			flattening of head with pitting
2	5	skull	mandible	part L ramus with condyle	1			area of erosion on condyle, worn flat, slight lipping
2	5	skull	mandible	L ramus & head	1			hollow with pitting reactive growth on articular surface
2	3	skull	mandible	fragment with R head ramus	1			area of bone loss with pitting on articular surface
2	4	skull	mandible	fragment with R head ramus	1			almost total destruction of head - flattened wear, marked lipping medial side
2	4	skull	mandible	fragment with R head ramus	1			flattening of head with pitting + latero-medial expansion
2	4	skull	mandible	fragment with L head ramus	1			1 with scooped out pitted area just posterior to articular surface;
2	4	skull	mandible	fragment with L head ramus	1			scooped out pitted area just lateral to articular surface & lipping lateral side of head (medial side damaged)
2	5	skull	mandible	fragment with left ramus/condyle	1			erosive lesion in the centre of head, almost bifurcating it - raised 'bump' on posterior side head

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Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	5	skull	occipital	fragment condyle	1			condyle flattened and worn, very slight lipping around edge
2	5	skull	occipital	fragment condyle	1			slight pitting on surface very slight lipping around edge
2	5	skull	temporal	fragment with mandibular fossa	1			moderate pitting on fossa surface
3	5	skull	temporal	temporo-mandibular fossa	1			erosion of facet, much wider than normal, lipping around facet edge
2	3/4	spine	atlas	fragment	3			lipping around facet for dens
2	4	spine	atlas	fragment with right facets	1			pitting in superior facet
2	4	spine	atlas	fragment with facet for dens	1			slight lipping around facet for dens
2	5	spine	atlas	fragments with facet for dens of axis	4			lipping around rim of facet, 1 moderate, 3 slight
2	5	spine	atlas	fragments with L superior & inferior facets	3			pitting/lipping both facets
2	5	spine	atlas	fragment with R superior & inferior facets	1			moderate pitting and lipping of both facets
2	5	spine	atlas	fragment with facet for dens of axis	1			moderate lipping around superior facet
2	5	spine	atlas	fragments with facet for dens	3			2 with slight lipping around facet, 1 with moderate lipping
2	5	spine	atlas	fragment with facets	1			large bony spur on right superior facet
2	5	spine	atlas	fragment with facets	1			L inferior facet has lipping pitting & irregular growth
3	5	spine	atlas	fragment with facets	1			L inferior facet has lipping pitting & irregular growth
3	5	spine	atlas	fragment with facets	1			both L facets pitted with irregular growth, fragment very porous
3	5	spine	atlas	fragment with facets	1			L superior facet has lipping pitting & irregular growth, very porous, inferior facet normal
3	4	spine	atlas	fragments with facets for dens	2			moderate lipping around facet for dens
3	5	spine	atlas	fragments with facets for dens	3			2 with slight lipping; 1 with moderate lipping
3	6	spine	atlas	fragments with facet for dens	4			1 with slight lipping around facet for dens; 2 with moderate lipping; 1 with gross lipping & destruction/reactive growth & eburnation
3	3	spine	axis	dens only	1	?		lipping, bone destruction on dens
3	3/4	spine	axis	fragment	2			lipping around dens
3	3/4	spine	axis	fragment	1			slight lipping around inferior articular surface
3	5	spine	axis	fragments with dens	8			fragments with lipping around dens
3	4	spine	axis	fragments with dens	3			lipping at dens
3	5	spine	axis	fragment with dens	1			moderate lipping & eburnation on dens
3	4	spine	axis	complete or with dens	4			slight lipping around dens
3	5	spine	axis	fragment with dens	3			1 with slight lipping on dens; 2 with moderate lipping on dens
3	4	spine	cervical vertebra	fragment body	1			moderate lipping around inferior edge body (superior edge damaged)
3	5	spine	cervical vertebra	fragments with bodies	7	25+		5 with slight lipping around body edges; 2 with moderate lipping
3	6	spine	cervical vertebra	body fragments	8	25+		4 with slight lipping around body edges; 3 with moderate lipping; 1 with moderate lipping around superior edge body (slight lipping inferior edge) bone destruction/reactive growth superior body surface
3	3	spine	cervical vertebra	body only	1	adult		lipping around body
3	3/4	spine	cervical vertebra	body only	3			lipping around both edges of body
3	3/4	spine	cervical vertebra	body only	1			lipping around inferior edge body
3	3/4	spine	cervical vertebra	body & facets	1			lipping on superior articular facet
3	5	spine	cervical vertebra	bodies	21	25+		lipping/pitting on bodies

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
3	4	spine	cervical vertebra	alcp	3	25+		2 articulating CVs with anterior & posterior lipping
3	4	spine	cervical vertebra	bodies	3	25+		lipping around body edges
3	5	spine	cervical vertebra	bodies	3	25+		3 articulating CVs with gross lipping, pitting & reactive growth, bones very porous
3	5	spine	cervical vertebra	body	1	25+		gross lipping, pitting & reactive growth, bone very porous
3	5	spine	cervical vertebra	body only	1	25+		marked lipping & pitting both body surfaces, bone appears very porous
3	5	spine	cervical vertebra	fragment body	1	25+		marked lipping & pitting both body surfaces, bone appears very porous
3/4	3	spine	cervical vertebra	fragments with bodies	2	25+		2 articulating CVs with lipping & irregular growth around bodies
3/4	4	spine	cervical vertebra	body only	1	25+		moderate lipping around both surfaces of body
3/4	5	spine	lumbar vertebra	fragments with bodies	8	25+		1 with slight lipping & Schmorl's node inferior surface; 1 with linear depression superior surface; 1 with Schmorl's node superior surface; 1 with moderate lipping edge superior surface; 4 with severe lipping
3/4	6	spine	lumbar vertebra	fragments with body	1	25+		1 with slight lipping on one edge of body (the other edge missing), the body surface is smooth but undulating
3/4	3/4	spine	lumbar vertebra	alcp	1	25+		lipping around body edges & inferior facets, the whole vertebra is skewed to the right
3/4	3/4	spine	lumbar vertebra	alcp	1	25+		osteophytes underside lamina, lipping inferior body edge
3/4	3/4	spine	lumbar vertebra	alcp	15	25+		lipping around body edges
3/4	3/4	spine	lumbar vertebra	alcp	2	25+		lipping, pitting on facets
3/4	3/4	spine	lumbar vertebra	posterior part only	1	25+		osteophytes under lamina, pitting, lipping around facets
3/4	3/4	spine	lumbar vertebra	body only	1	25+		massive lipping around body, extends 12 mm
3/4	3/4	spine	lumbar vertebra	body only	2	25+		slight lipping around body edges
3/4	3/4	spine	lumbar vertebra	body only	3	25+		moderate lipping around body edges
3/4	5	spine	lumbar vertebra	body	1	25+		Schmorl's nodes & pitting & irregular growth on inferior surface
3/4	5	spine	lumbar vertebra	bodies	4	25+		pitting & irregular growth on body surfaces
3/4	5	spine	lumbar vertebra	bodies	2	25+		slight lipping around body edges
3/4	5	spine	lumbar vertebra	body	1	25+		severe lipping on superior edge body & slight lipping on inferior edge
3/4	4	spine	lumbar vertebra	alcp & bodies	5	25+		moderate lipping around bodies
3/4	5	spine	lumbar vertebra	alcp	1	25+		moderate lipping around both surfaces of body
3/4	3	spine	lumbar vertebra	fragment body	1	25+		lipping & irregular growth around body
3/4	4	spine	lumbar vertebra	fragment body	1	25+		slight lipping around body edges
3/4	4	spine	lumbar vertebra	fragment body	1	25+		moderate lipping around body edges
4	5	spine	sacrum	1st body	1			slight lipping around body edge
4	5	spine	sacrum	1st body	1	25+		moderate/severe lipping superior edge
3/4	3/4	spine	sacrum	1st body	1	25+		gross lipping on lumbar surface
2	5	spine	thoracic vertebra	bodies	2	25+		osteophytic formation on underside lamina
4	5	spine	thoracic vertebra	fragments with bodies	9			1 lower TV with very irregular body surfaces & Schmorl's nodes; 1 fragment with Schmorl's node inferior surface; 2 upper TVs with slight lipping inferior body surfaces; 5 with moderate lipping around body edges
4	3/4	spine	thoracic vertebra	transverse process	2			lipping in costal facet
4	3/4	spine	thoracic vertebra	complete or alcp	6	25+		osteophytes underside of lamina
4	3/4	spine	thoracic vertebra	complete or alcp	11	25+		lipping around both edges body
4	3/4	spine	thoracic vertebra	complete or alcp	3	25+		lipping around inferior edge body
4	3/4	spine	thoracic vertebra	complete or alcp	4	25+		pitting, lipping or eburnation facets
4	3/4	spine	thoracic vertebra	complete or alcp	2	25+		pitting, lipping of facets + lipping around body
4	5	spine	thoracic vertebra	bodies	11	25+		slight lipping around body edges
4	5	spine	thoracic vertebra	bodies	4	25+		Schmorl's nodes
4	5	spine	thoracic vertebra	body	1	25+		gross irregular growth and pitting of inferior surface
4	5	spine	thoracic vertebra	body	1	25+		pitting lipping & gross destruction of inferior facets
4	5	spine	thoracic vertebra	bodies	2	25+		2 articulating TVs with right anterior lipping, gives bodies appearance of being skewed

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Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
4	5	spine	thoracic vertebra	body	1	25+		lipping pitting and irregular growth, bone porous
4	5	spine	thoracic vertebra	fragment facet	1			marked lipping and pitting
4	4	spine	thoracic vertebra	alcp	1	25+		slight lipping around body edges
4	4	spine	thoracic vertebra	body only	1	25+		slight lipping around body edges
4	4	spine	vertebra	fragments bodies	4			all with moderate lipping
4	5	spine	vertebra	fragments bodies	10	25+		4 fragments with slight lipping around body edges; 6 with moderate lipping
4	6	spine	vertebra	small fragments body	2	25+		moderate lipping body edge
4	3/4	spine	vertebra	miscellaneous fragments	16			pitting on facets
4	3/4	spine	vertebra	miscellaneous fragments	2			osteophytes under lamina
4	3/4	spine	vertebra	fragments bodies	2			moderate lipping around body
4	5	spine	vertebra	fragments of body	34	25+		15 fragments with slight lipping around edges, 10 fragments with moderate lipping around edges, 3 fragments with severe lipping around body edges, 6 fragments with pitting & irregular growth on body surfaces
4	5	spine	vertebra	miscellaneous vertebral fragments	53			7 with osteophytes on underside lamina, 4 with osteophytes underside lamina & pitting & lipping of facets, 42 with lipping and pitting of articular facets
4	4	spine	vertebra	fragment bodies	6	25+		slight/moderate lipping round body edges
4	4	spine	vertebra	miscellaneous vertebral fragments	10			moderate lipping & pitting of facets - 2 with eburnation
4	5	spine	vertebra	body fragment	1	25+		fragment with moderate lipping & irregular growth, very porous
4	5	spine	vertebra	body fragments	3	25+		fragments with moderate lipping
4	5	spine	vertebra	fragments with facets	10			fragments with lipping, pitting and/or reactive growth of facets
4	5	spine	vertebra	fragments bodies	4	25+		small fragments with lipping on edge of bodies
4	4	spine	vertebra	fragment body	1	25+		moderate lipping around body edges
4	4	thorax	rib	fragment right with tubercle	1	20+		moderate lipping around tubercle with small area of eburnation
4	4	thorax	rib	fragment right with tubercle	2	20+		moderate lipping around tubercle
4	3/4	thorax	rib	fragment with tubercle	1			pitting of facet at tubercle
4	3/4	thorax	rib	fragments with tubercle	1	20+		marked lipping around facet at tubercle
4	5	thorax	rib	fragments with heads/tubercles	4	20+		pitting and lipping of tubercles
4	5	thorax	rib	fragments with tubercles/heads	25	20+		10 with slight lipping around tubercle; 10 with moderate lipping around tubercle; 1 with pitting/lipping of tubercle; 2 with pitting/lipping of head; 2 with slight lipping around head
4	6	thorax	rib	fragments with tubercles	10	20+		slight lipping around tubercles
4	6	thorax	rib	fragments with tubercles	2	20+		moderate lipping around tubercles
4	5	upper limbs	clavicle	left sternal end	1			gross destruction of sternal articulation
4	5	upper limbs	clavicle	fragment right with sternal end	1	25+		slight pitting on sternal articulation
4	5	upper limbs	clavicle	fragment right with sternal end	1	?		gross hollowed destruction of articulation, part of surface still billowed so epiphysis possibly unfused
4	4	upper limbs	humerus	small fragment distal end	1	14+		lipping around trochlea with eburnation
4	4	upper limbs	humerus	fragment right with olecranon fossa	1	14+		pitting articular growth around articular surface & in olecranon
4	5	upper limbs	humerus	fragment left with medial epicondyle and trochlea	1	14+	?	eburnation and grooving on capitulum, w. moderate lipping on the medial edge
4	6	upper limbs	radius	fragment right with radial tuberosity & head	1			circular depression & pitting on head & pitting on radial tuberosity
4	3/4	upper limbs	scapula	fragment left with glenoid cavity	1	15+	M?	gross change in glenoid, large pits & reactive growth

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
4	3/4	upper limbs	scapula	fragment left with glenoid cavity	1	15+	?	glenoid cavity flattened & pitted, lesion at attachment for triceps
4	5	upper limbs	scapula	fragment left with glenoid cavity	1	15+		2/3 of cavity shows evidence of bone destruction, unclear if this is pathological or pm damage
4	5	upper limbs	scapula	fragment left with part glenoid	1	15+		reactive growth over articular surface
4	6	upper limbs	scapula	fragment with glenoid cavity	1	15+		pitting on surface glenoid
4	5	upper limbs	scapula	fragment right with glenoid cavity	1	15+		slight lipping around edge of glenoid
4	5	upper limbs	scapula	fragment right with glenoid cavity	1	15+		oval depression in centre of glenoid - 7x5 mm deep, centre of depression pitted, margin of depression slightly raised, pitting around depression
4	5	upper limbs	scapula	fragment right with glenoid cavity	1	?		superior end has pitting & irregular growth on articular surface and lipping around edge, pitting & destruction of bone in hollow on costal surface between & below coracoid process and glenoid - 13.5 mm below notch
4	6	upper limbs	scapula	fragment right with glenoid & axillary border	1	15+	M?	wear & irregular growth on glenoid
4	5	upper limbs	scapula	fragment glenoid	1	?		uneven surface on glenoid - only part of cavity in articulation?, pitting & irregular growth on surface & around edge
4	5	upper limbs	scapula	fragment glenoid	1	?		pitting & irregular growth on centre of cavity
4	5	upper limbs	scapula	fragment glenoid	1	?		1/3 glenoid only, glenoid flattened & slightly pitted, moderate lipping around edge
4	5	upper limbs	scapula	fragment glenoid	1	?		coracoid 1/2 of glenoid only, marked pitting on dorsal 1/2 edge of cavity, 2 sinuses on dorsal edge
4	5	upper limbs	scapula	fragment glenoid	1	?		coracoid end of cavity missing, marked pitting on cavity and lipping around edge
4	5	upper limbs	scapula	fragment glenoid	1	?		coracoid end of cavity missing, very marked pitting on cavity and lipping around edge
4	5	upper limbs	scapula	fragment glenoid	1	15+		superior 1/2 glenoid, pitting in the centre of cavity
4	3/4	upper limbs	ulna	proximal end & part shaft left	1	19+		fairly severe changes around whole of articulation, moderate lipping & pitting, reactive growth around olecranon & coronoid process
4	3/4	upper limbs	ulna	proximal end & part shaft right	2	19+		pitting & slight lipping around whole articular area
4	5	upper limbs	ulna	fragment right proximal end and shaft	1	15+		slight lipping around semilunar notch and on epiphysis
4	5	upper limbs	ulna	fragment right proximal end and shaft	1	15+		slight lipping around semilunar notch
4	5	upper limbs	ulna	fragment inferior part of head of left	1	?		eburnation inferior part semilunar notch, proximal part missing
4	5	upper limbs	ulna	fragments left with radial notch	3	14+		pitting and lipping of and around radial notch
4	5	upper limbs	ulna	fragment left with radial notch	1	14+		gross destruction of radial notch
4	6	upper limbs	ulna	fragment left proximal end	1	14+	M?	lipping on posterior surface of olecranon, possible match for below
4	5	upper limbs	ulna	fragment right with radial notch	1	14+		slight lipping around radial notch
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Tomb N, Hili Gardens: Trauma

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	3/4	feet	calcaneus	almost complete right	1			large area bony growth (18x18x6) on medial process posterior surface - worn flat with pitting
2	3/4	feet	calcaneus	complete right	1			spurs bony growth posterior surface
2	3/4	feet	calcaneus	complete right	1			spurs bony growth posterior surface
2	3/4	feet	calcaneus	complete right	1			spurs bony growth posterior surface
2	5	feet	calcaneus	fragment	1			moderate osteophytes on heel
4	4	feet	metatarsal 2nd	proximal 2/3 left	1			marked thickening of shaft. ?# - if so spiral; ?infection but no surface change.
2	5	feet	metatarsal 5th	complete left	1	15+		healed #, proximal 1/3
4	6	feet	metatarsal 5th	left, head missing	1	?		distortion & irregular bone formation mid diaphysis = #?
4	5	feet	phalanx 1st proximal	complete	1	15+		marked deviation proximal end with evidence of bone remodelling on shaft - # proximal 1/3
2	5	feet	phalanx middle	shaft	1			healed mid-shaft #
1	3	feet	phalanx proximal	complete	1	adult		# proximal end, involves articular surface
1	4	feet	phalanx proximal	complete	1	adult		healed # shaft
2	5	feet	phalanx proximal	complete	1	15+		healed mid-shaft #
2	5	feet	phalanx proximal	complete	1	15+		healed mid-shaft #
2	5	feet	phalanx proximal	complete	1	15+		avulsion # in base
2	5	feet	phalanx proximal	complete	1	15+		avulsion # in base
3	4	feet	phalanx proximal	complete	1	15+		healed mid-shaft #, slight deviation
4	4	feet	phalanx proximal	complete	1	15+		healed mid-shaft #
3/4	5	feet	phalanx proximal	complete	1	15+		midshaft distortion, deep pit on plantar surface just distal to proximal articulation - healed #?
4	5	hands	metacarpal 1st	complete left	1	15+		proximal ½ bone markedly curved towards palm with slight deviation mid shaft = #? Both articular ends normal
4	6	hands	metacarpal 1st	almost complete right	1	15+		slight deviation of shaft, thickening of proximal ½ shaft and proximal articulation, shaft appears shortened, some irregular growth on shaft, lipping mediodistal side head, lipping lateral side proximal articulation (medial side damaged) = healed # with secondary arthritis
3	5	hands	metacarpal 3rd	head missing	1			one with damage to styloid process (?healed #)
3	4	hands	metacarpal 4th	proximal end left	1			healed # just distal to the base
4	6	hands	metacarpal 5th	proximal end right	1	?		osteophyte just distal to proximal end at the medial side. Cause? - no evidence of #, ligament damage?
2	3/4	hands	phalanx	complete	1	15+		healed mid-shaft #
4	6	hands	phalanx distal	complete	1	15+		angulation and bony spur on dorsal surface, distal 1/3 shaft -healed #
4	5	hands	phalanx middle	complete	1	15+		deviation mid shaft & area of destruction =#?
4	4	hands	phalanx proximal	alcp	1	15+		very marked medial & lateral muscle attachments, giving palmar surface a scooped out appearance, dorsal shaft has slight bulge - possible # site?
2	5	lower limbs	femur	fragment of shaft	1	?		small fragment with callus formation and pitting - site of #?
2	5	lower limbs	femur	fragment of shaft	1	?		small fragment with callus formation, pitting and sinus - site of # with infection?
2	3/4	lower limbs	fibula	shaft	1			shaft # callus formation
4	4	lower limbs	tibia	fragment diaphysis left	1			ensethopathic lesion along soleal line, more marked inferiorly
3	5	skull	malar	zygomatic arch	1			# arch with slight deviation, # line still visible, presence of sinus indicates infection
2	3/4	spine	atlas	fragment	1			?#, double line pitting superior articular facet with lump in spinal column + pitting inferior articular facet, groove across lamina, arches not fused but appears adult, trauma in childhood?
4	4	spine	axis	complete	1			dens is at a strange angle - possible healed fracture?, slight lipping around dens
2	3/4	spine	lumbar vertebra	alcp	1	25+		moderate loss anterior body height, severe lipping around body, osteophytes under lamina
2	3/4	spine	lumbar vertebra	alcp	1	25+		slight loss body height on left, slight lipping around body
2	3/4	spine	thoracic vertebra	complete or alcp	1	25+		loss anterior height body = #?
2	3/4	thorax	rib	right shaft fragment	1			midshaft # rib, healed well on external surface but large bony mass over site of break on internal surface - no displacement
2	3/4	thorax	rib	shaft fragments	1			probable shaft #

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	3/4	thorax	rib	shaft fragments	1			probable shaft #
2	3/4	thorax	rib	shaft fragments	1			probable shaft #
2	3/4	thorax	rib	shaft fragments	1			probable shaft #
2	4	thorax	rib	fragment shaft	1			healed # with slight displacement (appears adult)
2	4	thorax	rib	fragments shaft	2	young child		2 fragments from same child with callus formation - 2 ribs ~#?
3	4	thorax	rib	shaft fragment	1	?		callus formation = site of #
4	4	thorax	rib	fragment shaft	1			evidence of a healed #
4	4	thorax	rib	fragment right with head/tubercle	1	20+		gross distortion & enlargement of tubercles with irregular ossification & broadening of the whole bone - #? with infection?, internal surface is unchanged although much broader
4	5	thorax	rib	shaft fragments	1			thickening shaft external surface, no clear evidence of # = infection?;
4	5	thorax	rib	shaft fragments	1			slight deviation of shaft = healed #;
4	5	thorax	rib	shaft fragments	1			thickening of shaft, pitting superior edge & reactive growth inferior edge, some remodelling of bone both interior & exterior surfaces = #?
3/4	5	thorax	rib	fragment shaft	1	adult?		callous formation following #?
4	6	thorax	ribs	fragment shaft	1			callus formation on internal & external surface, no deviation = healing #
4	4	upper limb	clavicle	fragment diaphysis	1			healed # - no displacement
4	4	upper limb	ulna	fragment right with radial notch	1	?		1 with gross distortion of proximal end (olecranon & semilunar notch missing) area inferior to radial notch is flattened, with a large depression and some deep pits, the radial notch is flattened & enlarged, the semilunar notch and coronoid process is twisted medially = ?trauma ?#
2	3/4	upper limbs	clavicle	shaft left	1			healed # shaft at acromial 1/3, thickening of bone with slight deviation, hole at site of break, possible pus sinus
2	5	upper limbs	clavicle	fragment left with conoid tubercle & acromial end	1	25+		3 pits and slight deviation acromial 1/3 = #; pitting and slight lipping around acromial articulation (sternal end missing)
2	5	upper limbs	clavicle	fragment left with sternal end	1	25+		large lesion 9x5x4 mm at site for costoclaviclular ligament, surface of bone fully destroyed - torn ligament?
2	5	upper limbs	clavicle	sternal 1/3 left	1			articular surface irregular epiphysis appears unfused, area of porosis on superior side just medial to sternal articulation, slight flattening when viewed anterior/posteriorly, slight deviation from superior view = #/dislocation?
3	4	upper limbs	clavicle	acromial end	1	?		healed # acromial 1/3 with some displacement
4	6	upper limbs	clavicle	fragment of right sternal end	1	25+		deep area of bone destruction at site for costoclaviclular ligament, surrounded by area of additional growth - ensethopathic lesion?
4	6	upper limbs	clavicle	fragment of right sternal end	1	under 25		deep area of pitting and irregular growth at site for costoclaviclular ligament - ensethopathic lesion?
3	5	upper limbs	radius	fragment with head	1			avulsion # of part of rim of head?
3	5	upper limbs	scapula	part acromion	1			gross flattening, lipping, pitting & eburnation anterior surface acromion near facet for clavicle. ?dislocation of acromio-clavicular joint - arthritis?
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Tomb N, Hili Gardens: Metabolic Disease

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
1	4	skull	cranium	small fragment	1	child		fine pitting external surface
1	4	skull	cranium	small fragment	1	child		fine pitting external surface
1	4	skull	cranium	small fragment	1	child		fine pitting external surface
2	5	skull	cranium	miscellaneous fragments	6			some very thick fragments - measurements 11.07, 11.12, 10.91, 10.15, 10.94, 11.49 1
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
2	3/4	skull	cranium	fragment	1	?		fine pitting on external surface
3	5	skull	cranium	general cranial fragments	2	infant?		fine sporadic pitting on external surface
3	5	skull	cranium	general cranial fragments	3	adult?		fine pitting on external surface
3	5	skull	cranium	general cranial fragments	3	infant?		small holes in inner table, possibly pathological
3	5	skull	cranium	general cranial fragments	2	child?		reactive growth on internal surface, no pitting
3	5	skull	cranium	general cranial fragments	3	child?		classic raised reactive growth
4	3	skull	cranium	small fragment	1	young child		additional labyrinth-like growth on external surface
4	3	skull	cranium	small fragments	2	infant		fine pitting on external surface
4	3	skull	cranium	small fragments	1	?		fine pitting on external surface
4	4	skull	cranium	fragments	8			fine pitting over external surface - otherwise normal
4	4	skull	cranium	fragment	1			large pits external surface, expanded diploe, 10 mm very fine outer table
4	4	skull	cranium	small fragments	9			marked porosity on external surface, expanded diploe, no outer table, at least 6 fragments are parietal
4	5	skull	cranium	fragments	5			5 fragments with exceptional thickness - all parietal - 1 @ 9.51 with fine pitting on the external surface; tables appear to be of normal thickness; 1 @ 12.04, no pitting, tables appear normal but there is a circular lesion on the external surface 9.8 mm in diameter, bone remodelling on edge of lesion with pitting in the middle; 10.77 - no pitting tables appear normal; 1 @ 20 mm thick; 1 @ 14 mm thick
4	5	skull	cranium	fragments	15			bones (mostly parietal) appear normal but fine pitting on external surface.
4	5	skull	cranium	fragments	5	child(ren)		fine pitting on external surface
4	5	skull	cranium	fragments	3			at least 2 are parietal, exceptional thickness but diploe thickened and spongy with some large trabeculae - average thickness 10 mm
4	5	skull	cranium	fragments	10			10 fragments with raised honeycomb lesion - e.g. one is 9 mm thick at raised area, 3.5 mm on normal area
4	6	skull	cranium	fragments	7			fragments, mostly parietal, with excessive thickness, e.g. 10.42, 10.91, 12.5, 10.48 - all have thickened outer table, otherwise normal
4	6	skull	cranium	fragments	7			excessive thickness - but with enlarged spongy diploe, e.g. 11.72, 11.14, mostly parietal
4	6	skull	cranium	fragments	7			fragments with fine pitting mostly parietal, otherwise normal
4	6	skull	parietal	fragment	1			reactive growth external surface
3/4	5	skull	cranium	small fragments	7	child?		raised, labyrinth-like or pitted lesions on external surface
3/4	5	skull	cranium	small fragment parietal? or frontal?	1	?		platelets/pitting on the internal surface - destruction of the internal table?. The trabeculae in the diploe appeal enlarged
1	3	skull	frontal	upper orbit	1	?	?	pitting in orbit, probably pathological
1	3	skull	frontal	L upper orbit	1	infant		slight pitting in orbit
1	3	skull	frontal	L upper orbit	1	child		deep pits in orbit

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	4	skull	frontal	fragment with left orbit	1			area of thickened reactive growth in orbit, orbit edge sharp bone fine - probably immature
2	4	skull	frontal	fragment with orbit - side unclear	1			raised area of reactive growth, small fragment side unclear, appears immature
2	5	skull	frontal	R orbit	3			pitting in orbit
2	5	skull	frontal	L orbit	1			pitting in orbit
2	5	skull	frontal	L orbit	1	child		very marked pitting in orbit
2	5	skull	frontal	orbit, side unclear	1	child		pitting on orbital surface
2	3/4	skull	frontal	R orbit	1	child		pitting in orbit
2	3/4	skull	frontal	R orbit	1	child		pitting in orbit
2	3/4	skull	frontal	right side R orbit	1	adult		pitting & irregular growth in orbit
2	3/4	skull	frontal	upper edge R orbit	1	child		area of raised growth surrounded by pitting
2	3/4	skull	frontal	upper edge L orbit	1	adult?		slight pitting in orbit
2	3/4	skull	frontal	part L orbit	1	adult?		pitting & irregular growth in orbit
2	3/4	skull	frontal	almost complete L orbit	1	infant		slight pitting, may be pathological
2	3/4	skull	frontal	L orbit	1	?		slight pitting visible
2	3/4	skull	frontal	L orbit	1	child		slight pitting in orbit
2	3/4	skull	frontal	R orbit	1	child		slight pitting
2	3/4	skull	frontal	L orbit	1	?		fine pitting in orbit
2	3/4	skull	frontal	part orbit, side unclear	1	child		slight pitting in orbit
2	3/4	skull	frontal	part orbit, side unclear	1	?		fine pitting & reactive growth
2	3/4	skull	frontal	part L orbit	1	child		marked pitting & reactive growth in orbit
3	4	skull	frontal	fragment	1			fine pitting on external surface but clear extra layers of bone when viewed in profile - cranial wall 8.18 at thickest (excluding frontal crest)
3	4	skull	frontal	L orbit	2			gross reactive growth with thickening of orbit surface
3	4	skull	frontal	L orbit	2			slight reactive growth in orbits
3	4	skull	frontal	R orbit	1			reactive growth/pitting in orbit
3	4	skull	frontal	fragments orbit	8			fine pitting in orbit
3	5	skull	frontal	with left orbit	1	adult?		marked area of destruction central orbit, with reactive growth
3	5	skull	frontal	with left orbit	1	older child?		reactive growth in orbit
3	5	skull	frontal	with left orbit	1	adult?		reactive growth in orbit
3	5	skull	frontal	with left orbit	1	child?		reactive growth and pitting in orbit
3	5	skull	frontal	with left orbit	1	infant		fine pitting in orbit
3	5	skull	frontal	with left orbit	1	infant		pitting in orbit
3	5	skull	frontal	with right orbit	1	child?		reactive growth in orbit
3	5	skull	frontal	with right orbit	1	infant		fine pitting in orbit
3	5	skull	frontal	with right orbit	1	infant		reactive growth in orbit
4	3	skull	frontal	L upper orbit	1	older child?		reactive growth in orbit with pitting
4	3	skull	frontal	L upper orbit	1	adult?		reactive growth in orbit with pitting
4	3	skull	frontal	L upper orbit	2	infant		reactive growth in orbit with pitting
4	3	skull	frontal	L upper orbit	1	young child		deep pits in socket with some reactive growth
4	4	skull	frontal	fragment frontal with R orbit	1			area destructive pitting in centre of orbit
4	4	skull	frontal	fragment frontal with R orbit	1			fine pitting over orbit
4	4	skull	frontal	fragment frontal with R orbit	1			raised area of proliferative growth in orbit
4	4	skull	frontal	fragment frontal with L orbit	1			area of fine proliferative growth over orbit
4	4	skull	frontal	fragment frontal with L orbit	1			area of pitting in upper orbit
4	4	skull	frontal	fragment frontal with L orbit	1			area of pitting/destructive growth in orbit

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
4	4	skull	frontal	fragment frontal with L orbit	1			area of proliferative growth in upper orbit
4	4	skull	frontal	fragment of orbit	1			marked raised area proliferative growth, large trabeculae
4	4	skull	frontal	fragment of orbit	1			large area of pitting in orbit
4	4	skull	frontal	fragment of orbit	1			small area pitting in orbit
4	4	skull	frontal	fragment of orbit	1			area proliferative growth, large trabeculae
4	4	skull	frontal	fragment of orbit	1			area proliferative growth, large trabeculae
4	4	skull	frontal	fragment of orbit	1			small area pitting in orbit
4	5	skull	frontal	fragment with right orbit	1			marked reactive growth in upper part orbit
4	5	skull	frontal	fragment with left orbit	1			fine reactive growth in orbit
4	5	skull	frontal	fragment with right orbit	1			fine pitting in orbit
4	6	skull	frontal	fragments with small part orbit - side unclear	2			2 with pitting/thickening in orbit
3/4	5	skull	frontal	fragment with R orbit and R inferior part frontal	1	adult?		area reactive growth upper orbit
3/4	5	skull	frontal	R upper orbit	1	?		area reactive growth upper orbit
3/4	5	skull	frontal	fragment with R orbit and R inferior part frontal	1	adult?		slight reactive growth in orbit
3/4	5	skull	frontal	R upper orbit	1	?		slight reactive growth in orbit
3/4	5	skull	frontal	L upper orbit & small part brow	1	?		pitting/reactive growth in orbit
3/4	5	skull	frontal	R orbit with orbital edge missing	1	child?		large pits in the superior/centre of orbit
4	5	skull	malar	fragment with left frontal process	1			frontal process with pitting on the external surface
2	4	skull	mandible	part left	1	c. 6 months		fine pitting all over external surface of mandible
4	4	skull	occipital	fragments	3			fine pitting over external surface - otherwise normal
1	3	skull	parietal	fragment	1	child?		slight pitting external surface
1	3	skull	parietal	fragment	1	child?		slight pitting external surface
1	4	skull	parietal	small fragment	1	child		moderate pitting external surface
4	3	skull	parietal	small fragments	2	young child		additional labyrinth-like growth on external surface
4	4	skull	parietal	fragments	10			fine pitting over external surface - otherwise normal
4	4	skull	parietal	fragment left	1	child (not infant)		area of pitting towards posterior/central part
4	4	skull	parietal	fragment	1			fine pitting over external surface - dense thickened outer table. 8 mm
4	4	skull	parietal	fragment	1			fine pitting on external surface, expanded diploe
4	4	skull	parietal	fragment	1			fine pitting on external surface, expanded diploe - 12 mm
4	4	skull	parietal	fragment	1			fine pitting on external surface, expanded diploe - 8.9 mm
3/4	5	skull	parietal	small fragments	2	child?		raised, labyrinth-like lesions on external surface
3/4	5	skull	parietal	small fragments	4	child?		pitting on external surface
3/4	5	skull	parietal	small fragments	1	child?		pitting/reactive growth on internal surface
3	4	skull	skull	fragmentary cranium w. parietals, frontal, occipital & temporals	1	under 17		area fine pitting (20 x 20 mm) upper anterior crown, right parietal
3	4	skull	skull	fragmentary cranium	1	older child?		large area very marked porotic hyperostosis left parietal, few fragments right parietal + pitting/reactive growth in orbit
3	4	skull	skull	very fragmentary cranium	1	c. 18-25	M?	pitting & reactive growth in both orbits
3	4	skull	temporal	fragment	1			marked thickening of cranial wall - thickness 9.90 mm compared with 4.63 mm at sutural edge

Tomb N, Hili Gardens: Metabolic Disease

Section	Level	Area Affected	Bone	Completeness	No. Frags.	Age	Sex	Pathology
3	4	skull	temporal	fragment	2			2 fragments probably from same individual, either same bone although fragments do not join, or from a pair of temporals - with marked thickening pitting and reactive growth - cranial wall thickness 11.97 mm.
3	4	skull	temporal	fragment	19			all with varying degrees of typical hyperostosis
4	4	skull	temporal	fragment with zygomatic process	1			fine pitting over external surface
3	4	thorax	ribs	shaft fragments	8	infants		periosteal reaction on external surface
3/4	5	thorax	ribs	fragment shaft	1	foetus/ neonate?		fine periosteal reaction on external superior part
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Tomb N, Hili Gardens: Hypoplasia

Section	Level	Bone	Completeness	No. Frags.	Age	Pathology	Comments
1	3	lower right 1st premolar	complete	1	12+	1 band hypoplasia - c. 5	
1	3	lower right canine	distal 1/2	1	c. 11	2 bands hypoplasia - age c. 6	
1	3	upper left central incisor	complete	1	c. 3	band hypoplasia - age c. 2.5	
1	3	upper right central incisor	complete	1	10+	4 bands hypoplasia - ages 1-3	
1	3	upper right central incisor	compete	1	10+	3 bands hypoplasia - ages 1-3	
1	4	lower right canine	crown damaged	1	c. 12-14	2 indented lines - age c. 4-5	
2	4	lower right M1	mesial 1/2	1	c. 10	hypoplasia - single band, 1/3 crown from CEJ - age c. 2	
2	4	upper canine	part crown damaged	1	c. 10	hypoplasia - 1 deep band c. 6 years, less defined band c. 5 years + numerous other minor bands before and after	
2	4	upper right M1	roots damaged	1	c. 10	hypoplasia - 1 major, several minor lines - major 6 mm from CEJ - age major c. 6 years	
2	3/4	upper canine	fragment crown	1	c. 6	hypoplasia in the form of several lines & pits - age several periods 4-6 years	
2	3/4	upper central incisor	part crown	1	c. 4	hypoplasia - 3 bands near CEJ - 3 periods, c. 3 years	
2	3/4	upper central incisor	root damaged	1	?	hypoplasia - 2 grooves - 2 periods 2-3 years	
2	3/4	upper right lateral incisor	complete	1	c. 4-5	hypoplasia - 2 lines lower 1/3 crown w. yellow band from 1st band to base tooth - 2 periods c. 4 years	
3	5	maxilla	right	1		1 line hypoplasia PM1, age c.4; 1 line hypoplasia PM2, age c.5	
3	5	upper left central incisor	crown damaged	1	c. 10	hypoplasia - 3 lines - 6, 4 & 2 mm from CEJ - 3 periods 2-3 years	
3	5	upper left lateral incisor	complete	1	c. 8	hypoplasia - 2 lines close to CEJ - 2 periods c. 4 years	
4	3	lower right canine	crown damaged	1	12+	hypoplasia - wide band - age c. 5	
4	3	upper left central incisor	complete in 2 pieces	1	c. 10	hypoplasia - 2 (3?) indented lines - ages c. 3, 3 ½ (?), 4	
4	3	upper left M1	slight damage to crown & roots	1	c. 6	hypoplasia - 2 indented lines - c. 2 & 3 years	
4	3	upper right canine	complete	1	adult?	hypoplasia - 2 indented lines - c. 4 & 6 years	
4	3	upper right canine	complete	1	adult	hypoplasia - 2 deep lines with ridges + 1 band pits - 3 periods c. 6-7 years	1 line hypoplasia very slight; match for above
4	3	upper right central incisor	buccal surface crown damaged	1	c. 10	hypoplasia - 2 (3?) indented lines - ages c. 3, 3 ½ (?), 4	
4	3	upper right central incisor	enamel damaged	1	10+	hypoplasia - 2 deep pits followed by ridges - 2 periods c. 4	
4	3	upper right M3	slight damage to roots	1	adult	hypoplasia - 2 indented lines c. 11 & 12 years	
4	4	canine	part labial surface	1	adult	hypoplasia - one strong line 4 mm from CEJ - age c. 6	
4	4	upper canine	crown damaged	1	c. 11	hypoplasia 2 bands c. 5 & 6	
4	4	upper left M2	roots damaged	1	adolescent	hypoplasia - band, finishing just at the point where the roots start to bifurcate - age c. 10	
4	4	upper right M2	complete	1	c. 16	hypoplasia - single ridge running round crown 2 mm from CEJ - age c. 7	
4	5	lower right canine	complete	1	older adult	hypoplasia - 4 lines around lower ½ crown - 3-6 years	
4	5	lower right M1	palatal 1/2 only	1	c. 5	hypoplasia - single band - age c. 2 years	
4	5	lower right PM1	complete	1	older adult	hypoplasia - single line 1.5 mm from CEJ - c. 6 years	
4	5	upper canine?	crown damaged	1	13+	hypoplasia - 3 lines - 3, 6 & 7 years	
3/4	5	upper right canine	longitudinal 1/2 only	1	c. 11	hypoplasia - 2 linear bands near CEJ - 2 periods c. 6 years	linear developmental anomaly on crown just below mesial or distal CEJ to palatal surface (or further) possible associated with deviation of root
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Tomb N, Hili Gardens: Miscellaneous Pathology

Section	Level	Area Affected	Type of Disease	Bone	Completeness	No. Frags.	Age	Sex	Pathology
1	3	hands	?	R 1st metacarpal	incomplete	1	?	?	punched out lesion proximal margin head, palmar surface
2	3/4	skull	?	occipital	fragment w. central part	1	?		lump 15 x 20 mm external surface, some pitting external occipital crest + 3 large pits internal crest
2	3/4	skull	?	occipital	fragment w. central part	1	?		similar lump to above, but no associated pitting
2	3/4	skull	?	maxilla	fragment	1	?		marked pitting & irregular growth on palatal surface
2	5	skull	?	cranium	fragments	2			red-brown staining on cerebral surface - spots 3-7 mm some bone destruction within spots - unclear whether this is pre or post mortem
2	5	skull	?	cranium	fragment	1			very small cyst? on external surface
2	5	skull	?	cranium	fragment	3			depressions and pitting on cerebral surface
2	3/4	spine	?	axis	fragment				asymmetrical formation of lamina + partial fusion of part of arch
2	3/4	spine	?	TV	alcp	1	25+		spine skewed to L with pitting of R articular process
2	3/4	spine	?	TV	alcp	1	25+		spine skewed to R; L facets pitted & lipped
2	3/4	upper limb	?	radius	mid-shaft fragment	1			long raised scar (30 x 5 mm) on distal side and very marked interosseous crest
2	3/4	upper limb	?	radius	shaft in 2 pieces	1			shaft thickened, area around nutrient foramen thickened & raised, thickening around interosseous crest
2	3/4	lower limbs	?	fibula	shaft	3			periosteal reaction on shaft
2	5	upper limbs	?	humerus	detached head	1	under 17		almost complete unfused head with most of perimeter missing has a semicircular line of deep pits covering an area about 20 X 25 mm. No other obvious bony change or alteration in profile
2	5	feet	?	L talus	complete	1			large osteophytic formation between head and trochlear surface of body, 20 mm long - 7 mm high, surface of osteophyte is pitted
3	4	spine	?	LV	bodies	3	25+		gross overgrowth bone around edges of 3 articulating VT, the longest 46 mm although damaged - dripping candle appearance - DISH?
3	4	thorax	?	ribs	shaft fragment	1	?		pitting superior & inferior edge external surface
3	4	upper limbs	?	L humerus	distal 1/3	1	c. 1 year		fine pitting/reactive growth on shaft - periostitis?
3	4	lower limbs	?	fibula	section shaft	1	neonate		periostitis covering shaft
3/4	5	skull	?	mandible	L ramus & head	1			deep pit in articular area, extends into sub-cortical bone
3/4	5	hands	?	R proximal phalanx	complete	1	15+		'lump' of bone on the lateral side at the base of the head
3/4	5	hands	?	middle phalanx	complete	1	15+		strange lesion on the palmar shaft, appears scooped away down its length w. some sporadic pitting, from the side view the bone appears thin, articular ends appear unaffected
3/4	5	pelvis	?	innominate	fragment ilium with crest	1	20+		osteophytes on crest, extend up to 4 mm
3/4	5	feet	?	R navicular	alcp	1			deep pit in the centre of facet for talus
3/4	5	feet	?	proximal phalanx	complete	1	15+		'lump' (5X6 mm) of bone just distal to proximal articulation on dorsal surface, articular ends unaffected
3/4	5	feet	?	proximal phalanx	complete	1	15+		reactive growth (proliferative rather than periosteal) over whole of dorsal surface of shaft, plantar surface shaft & articular ends unaffected
4	3	thorax	?	ribs	small fragment shaft	1			periosteal reaction on both surfaces
4	4	skull	?	cranium	fragment part frontal part both parietals, part L orbit	1	adult		marked cranial thickness over most of frontal - on average 10 mm, excluding frontal crest. Thickness over parietal bosses 5.6 mm. No change on external or internal surfaces. Diploe appears wider with large trabeculae & inner and outer table thicker. No pathology in orbit

Tomb N, Hili Gardens: Miscellaneous Pathology

Section	Level	Area Affected	Type of Disease	Bone	Completeness	No. Frags.	Age	Sex	Pathology
4	4	skull	?	malar	fragment frontal process	1			marked periosteal reaction on external surface of frontal process - rest of malar missing
4	4	hands	?	metacarpal	proximal 1/2	1	15+		shaft is very wasted, and waisted!, triangular in section midshaft, slight pitting on head
4	4	hands	?	proximal phalanx?	shaft only	1			gross pathology of whole bone, internal & external - reactive growth, porosity, & 2 sinuses - infection?. No evidence of #
4	4	lower limbs	?	femur	fragment detached head	1	16+		1 with very deep impression for fovea capitis - at least 24 mm long, 10 mm wide & 5 mm deep (damaged). Surface of the bone is very smooth apart from a few smooth rounded pits.
4	5	feet	?	middle phalanx	complete	1	15+		long & curved spicule of bone in the centre of the dorsal surface of the proximal articulation, projecting proximally - 8 mm long
4	6	skull	?	temporal	fragments with external auditory meatus	2			slight lipping around meatus
4	6	skull	?	L temporal	petrous parts	4			2 with excessive growth along ridge next to internal acoustic meatus; 2 with abnormally small internal acoustic meatus
4	6	upper limbs	?	R ulna	fragment proximal end	1	14+	M?	sinus associated with some pitting & irregular growth on superior surface olecranon - pus sinus? = infection?; possible match for above
1	4	feet	congenital	middle & terminal phalanges	complete	1	adult		phalanges fused together
2	3/4	spine	congenital	TV	alcp	2	25+		2 fused TVs, loss height L side, fusion more complete L side, much pathological change.
2	3/4	lower limbs	congenital	pair femurs	head & neck	2	16+	F	heads not completely round, no neck margin on distal sides, head continues uninterrupted into neck
2	3/4	feet	congenital	middle & distal phalanges	complete	2	15+		both bones ankylosed
2	5	skull	congenital	mandible	R head mandible	1			deformed head with slight bifurcation on medial side, small foramen within bifurcation
2	5	feet	congenital	middle & distal phalanges	complete	1	15+		phalanges ankylosed, no other obvious pathology
3	5	hands	congenital	middle & distal phalanges	complete	2	15+		bones ankylosed with slight overlap and deviation
4	3	feet	congenital	middle/terminal phalanges	middle/terminal phalanges	1	15+		bones ankylosed
4	4	feet	congenital	middle & distal phalanges	complete	1	15+		middle & terminal phalanges ankylosed
4	4	feet	congenital	middle & distal phalanges	complete	1	15+		middle & terminal phalanges ankylosed
4	5	feet	congenital	middle & distal phalanges	complete	8			4 pairs of bones ankylosed
4	6	feet	congenital	middle & distal phalanges	complete	6	15+		3 middle & distal phalanges ankylosed, no evidence of any other bony change
2	4	skull	infectious	temporal	petrous part	1			large smooth hole (8 x 6 mm) on medial side on external auditory meatus, destroying the medial edge of the meatus - sinus? Internal auditory meatus is much smaller than normal - evidence of deafness?
2	5	skull	infectious	temporal	R mastoid process	1			pitting and abnormal growth all around surface of external auditory meatus
2	5	upper limbs	infectious	L humerus	fragment with distal end				distal 1/4 but with trochlea and capitulum missing, has large sinus (18 x 12 mm) just superior to coronoid fossa on the anterior side. This sinus seems clearly pathological because the edges are smooth but there are no associated bony changes. Unfortunately articular surfaces are missing.
2	5	pelvis	parturition scars?	R innominate	fragment of pubis	1	older adult?	F	marked scarring on ventral side

Tomb N, Hili Gardens: Miscellaneous Pathology

Section	Level	Area Affected	Type of Disease	Bone	Completeness	No. Frags.	Age	Sex	Pathology
2	5	pelvis	parturition scars?	L innominate	fragment of pubis	1	middle aged adult	F	marked scarring on ventral side
3	5	pelvis	parturition scars?	R innominate	fragment with pubic symphysis	1	old adult	F	very marked muscle attachments internal side - childbirth scars?
3/4	5	pelvis	parturition scars?	innominate	part pubis	1			pubic crest very enlarged, depression medial to crest - evidence of childbirth?
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